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JUNE, 1921

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ORIGINAL ARTICLES

RECONSTRUCTIVE SURGERY*

HARRY E. MOCK, M. D., F. A. C. S.
Chicago, Ill.

The efforts of the government to reclaim disabled soldiers from the recent World War have made familiar such expressions as "physical reconstruction", "rehabilitation", "occupational therapy", "functional re-education", and similar terms. The work which these expressions represent will either go down in the medical history of the war as beautiful theories and dreams of a group of idealists, or will stand forth as one of the greatest by-products of the world's struggle. The permanency of these terms in the nomenclature of the medical profession depends upon the practical application of these methods to peace time practice.

It must be emphatically pointed out that while the author is dealing with this subject from the surgical standpoint, yet the rehabilitation of the handicapped due to chronic diseases—the heart cases, the tuberculous, the nervous and mental cases,—furnishes even a greater problem, which can be successfully solved by physical reconstructive methods.

Likewise it must be noted that prior to the war physical reconstruction of disabled employees had been successfully practiced in a number of our industrial concerns throughout the country, although this work was not so designated. In fact, industrial medicine as practiced in a few concerns has furnished the greatest example of the feasibility of this form of human conservation and human reclamation.

As a result of this medical work in industry, providing as it does for the prevention of disease or accidents among the workers, and for the

complete restoration of the unfortunate victims of either and, as a result of the efforts in the army for the physical reconstruction, functional training and proper replacement of the disabled soldiers in useful jobs,—I say, as a result of these two great experiences, a new viewpoint has permeated the profession. No longer can the physician be content with an immediate medical or surgical end-result; instead, his work will be judged more and more by the economic end-result. Has he used every means to secure the greatest possible functional restoration? Has he followed up his case after discharge from treatment, to ascertain whether the patient has returned to employment, and whether or not that employment is such as to cause a recurrence of the condition—especially exemplified in cardiac diseases? Has he imbued his patient with a desire again to become a useful citizen, or has he allowed him to become "hospitalized" or "parasitized"? The economic end-result involves an affirmative answer to all these questions. The busy physician alone cannot accomplish this result, but he can secure the cooperation of such agencies as will insure its accomplishment. In fact, this viewpoint of greater responsibility to the handicapped is causing a close alignment between the physicians, educators, employment managers and social agencies of the community.

DEFINITIONS

Physical Reconstruction comprehends continued and complete medical and surgical treatment until the maximum physical and mental restoration of the disabled individual has been secured. While applicable to every type of disease or injury, physical reconstruction is usually meant to refer to the restoration of the permanently handicapped. Maximum restoration does not mean that function is completely restored, but refers to the greatest possible recovery when the nature of the disability is considered.

Likewise, physical reconstruction includes the use of all adjuncts which will assist in securing

*Read before the Southern Minnesota Medical Association meeting, Mankato, November, 1920.

this desired end. These adjuncts may be classified and defined as follows:

Functional Re-education consists of various methods to restore function in a disabled part, to train other members to new work, or to teach the amputation cases the use of artificial appliances.

Occupational Therapy is the use of some form of work which will bring into action certain muscles or disabled members of the body, in order to assist in their functional restoration, or which will keep the mind and body occupied during the long period of convalescence, thus preventing hospitalization and habits of idleness.

Physiotherapy includes the use of massage, hydro-, electro-, and mechanotherapy, muscle training exercises, gymnastics and calisthenics, for the purpose of restoring function or building up the general condition of the patient.

Rehabilitation, or the refitting of the disabled man to an independent economic position in society, consists of measures which are neither medical nor surgical, but which usually can be instituted during the course of the patient's medical treatment.

These measures include vocational training, or refitting the disabled for some specified work if his disability prevents the return to his former occupation, and the replacement of the handicapped at lucrative employment. Further medical and economic supervision is necessary to see that his rehabilitation is completed.

Convalescent Centers are places removed from the hospital and from the influence of the acutely sick, where patients no longer needing routine hospital care may be received after discharge, to convalesce under environment tending to hasten their restoration. In such a center, occupational therapy, physiotherapy and functional training are the chief methods of treatment.

Social Services: This is one of the most important adjuncts in the whole scheme of rehabilitating the permanently disabled. Its purpose is to combine with the curative work of the hospital a well organized human interest in the social and economic conditions of each patient in the wards. Such a department becomes the go-between twixt the doctor and the hospital, and those social agencies which can assist in securing proper convalescent environment, reeducation

when necessary, and the proper placement of discharged patients.

Reconstructive surgery, therefore, deals with the individual who through disease or injury, is threatened with, or has already become, the victim of permanent disability. In the first instance, by reconstructive methods, the handicap may be prevented or greatly reduced; in the second instance, either surgery or some of the adjuncts above defined may be utilized to obtain greater functional restoration. In both cases it implies the use of all methods to rehabilitate the patient to a state of social independence.

Reconstructive surgery is not limited to any one specialty, but can be applied to the general surgical field. For example, the eye surgeon will often have recourse to its methods to re-educate his blind patients, to train them to walk alone, and place them in employment. I have used it and seen it used in cases of facial paralysis following operations on the head. Plastic surgery about the face and other parts of the body furnishes an excellent example. In empyema it has a useful field, and I take advantage of occupational therapy and physiotherapy, especially bodily exercises, in almost all my laparotomy cases. It is my chief aid in all cases of traumatic neuroses. Its greatest field undoubtedly lies in bone and joint surgery, amputations, tendon and nerve surgery, many cases seen in industrial surgery, and in the usual orthopedic cases.

I recently attended the Central Orthopedic Association's annual convention in Chicago and Milwaukee, and was impressed with the extension of this specialty into the field of general surgery, chiefly due to the orthopedist's conception of the functional restoration of the disabled. While club feet, the deformities of poliomyelitis, Potts' disease, and tuberculosis of joints and bones were the usual clinical cases shown, yet many cases of deformities and disabilities following injuries were demonstrated. These included fractures, recent and ununited, osteomyelitis, nerve and tendon suturing, amputation cases, empyema with necrosis of the ribs, bone cysts, including bone cysts of the maxilla, syphilitic osteitis of the skull, gunshot wounds, and many other types of disabling injuries. Frequently the orthopedic surgeon had taken advantage of occupational therapy and physiotherapy, and in some cases even vocational training. The proof

of the success of their treatment, as pointed out with pride by the clinician, was that the patient returned to gainful employment. Their work illustrated a broad conception of reconstructive surgery.

Reconstructive surgery is synonymous with industrial surgery, with the exception that the latter must likewise include all methods of accident prevention. I refer not so much to the surgeon engaged purely in accident insurance practice, but to the broad gauged surgeon responsible for the care of the employes in a great industry. An accident occurs, and at once the industrial surgeon must approach the case with *prevention* uppermost in his mind. First he must think of the best line of emergency treatment which will prevent infection, permanent disability or death; second, he must map out suggestions or methods to prevent a recurrence of a like accident. One excellent surgeon who has a large insurance practice offered as his objection to the American Association of Industrial Physicians and Surgeons, that there was too much talk about accident prevention. Another surgeon, who had been very active in stamping out typhoid fever in his community, remarked that a certain industry was a regular gold mine for him, as he received five or six cases of hand infection or one or two fractures from this concern every week. When I inquired if he had ever visited the plant to devise means of preventing this great waste of human energy and loss, not only to the men, but to the employer and the community, he expressed the opinion that that feature of it was none of his business. A spirit of prevention must invade the mind of every surgeon if *preventive surgery* is to take its place with *preventive medicine*.

After the emergency treatment and the attention to prevention is given, the industrial surgeon then becomes a reconstructive surgeon; his efforts are directed to the best surgical procedure to prevent or overcome threatened disability; to utilize those methods which will most rapidly restore function; to get his patient out of the hospital early and back on the job at some light occupation—the best type of occupational therapy—and finally, to return the injured man to work as an efficient employee. Even then his responsibility is not ended, for he must examine

the man periodically to assure complete rehabilitation.

Thus I feel that the term reconstructive surgery is justified as indicating that branch of surgery which deals with the maximum functional restoration of the permanently handicapped, and the follow-up of the case until a proper and satisfactory economic end-result is assured.

SIZE AND CHARACTER OF THE HANDICAPPED PROBLEM

This field of industrial and reconstructive surgery has been sadly neglected by the great leaders in surgery. It would seem that during the last forty years the chief attention of these men has been directed toward abdominal surgery, tumor pathology, gynecology, and other types of surgical diseases. With the war the attention of the surgical profession has been directed toward traumatic surgery and the best methods of preventing and eradicating deformities. Today we find many of these leaders engaged in traumatic surgery, the result of industrial accidents, applying their knowledge gained during the war to this new-old field in surgery.

Let us consider the size and character of the problem, to see if it warrants this special attention from the profession: From the industrial field alone, consulting statistics furnished by the Department of Labor in 1917, one finds that annually 875,000 men and women are disabled for more than four weeks, as the result of accidents sustained in industry; that annually 76,000 people suffer loss of members, and at least 200,000 are otherwise permanently disabled by industrial accidents; that each year 28,000 of our people are killed as a result of industrial accidents.

Mr. S. S. Riddle, of the Department of Labor and Industry of the state of Pennsylvania, in a specially prepared bulletin (1918) sets forth the size of this problem as follows:

"The casualties suffered by the army of Pennsylvania workers—estimated to average continuously 3,000,000 during the two years and a half from January 1st, 1916, to July 1st, 1918—amounted to 577,053, including 7,575 fatalities, according to accident reports submitted during that period to the Pennsylvania Department of Labor and Industry. This includes all accidents disabling for a period of two days or more. * * * During the same period there were 3,798 industrial amputation cases of workers having lost arms, legs, hands, feet, fingers and toes. * * * * The total number of eyes lost through accidents

in Pennsylvania during that period was 1,157, with 29 men totally blinded."

The above figures deal with industrial accidents alone. Consider the great number of permanently disabled individuals, the result of accidents sustained at home, on the streets, on farms and in connection with the public utilities, which are not covered by the compensation laws. Already this year there have been over five hundred deaths from automobile accidents in the city of Chicago alone. It is a conservative estimate that at least ten times that number, or five thousand people, have been permanently handicapped, the result of automobile accidents in that city. It is said that the number of men who have lost legs or arms during the threshing seasons in the great wheat states of the northwest, runs into the thousands.

Four years ago a survey of all the crippled individuals in Cleveland, Ohio, was made, the total number found being 4,815 and this included injuries, deformities, or diseases involving the skeleton or skeletal muscles only. Of this number 49 per cent were under the age of fifteen at the time of the occurrence of the disability, while 43 per cent were between the ages of fifteen and fifty-nine years, or during the period of working life. Of this latter group, 40 per cent were due to accidents. A similar survey in every community throughout the land would undoubtedly reveal the fact that industrial accidents stand second as the cause of permanent disability.

Another factor contributing to the wastage of human life and energy on the part of industry and society, is the inadequate surgical care so often afforded these victims of accident. Too many industries practice a false form of economy by employing cheap, under-trained surgeons. This is too often true when insurance companies are responsible for the medical work; too often for the first few days or weeks following a serious accident, the injured person is under incompetent care. When serious complications develop the patient is rushed to a hospital and placed under expert care, in an effort to save his life. The life is saved, but the delay in rendering proper treatment results in a permanent handicap. Many injured, both from industry and from the streets, are admitted to the wards in our hospitals, and the immediate treatment or operation is usually performed

properly and well. This is followed by the daily dressing, but unfortunately, too often left only to the interne. For the remainder of the day, for weeks and weeks to come, the patient is left to his own devices. Lying there in idleness, with worry and melancholy his chief companions, is it any wonder that traumatic neuroses develop? Satisfied with a good surgical end-result, as usually interpreted, very little thought is given to the man's future usefulness.

Mr. A. Guinn James, County Court Judge under the Workmen's Compensation Act, in Bath, England, in a statement published in 1918, points out that in a large majority of the injury cases arising from accidents in mines and from machinery, which come before him, "the lack of proper and adequate medical treatment is simply appalling." He points out that many of these injured workmen receive the best of treatment in the hospital, but their after care is left to younger and less experienced physicians; that no attention is paid to massage or other forms of physiotherapy; that seldom are amputated cases fitted with artificial limbs; and criticizes the lack of co-ordinated care until the injured man is again able to work. "The result is often a stiff limb for life, and continuance of weekly payments from the insurance company, (probably for life) and the loss to the country of the man's earning powers."

With the exception of some of our large industries and a few far-visioned insurance companies, conditions similar to those described by this judge prevail generally in this country. A few industries salvage their disabled and make them efficient and independent. Some give these employees easy jobs where they can make a living, but the very softness of the job robs them of all incentive, and the bitterness engendered by dying ambition adds to their incompetency, so that they drift on to the scrap heap. Many concerns settle with their injured workmen when they are legally responsible, and then dismiss them; their disabled for whom they are morally responsible are scrapped without a settlement. These men, trained for certain occupations, who meet with permanent handicaps, are the waste products of our industrial life. Too often when employed again after their injury has healed they are ineffective, because they are thrust into a job without considering their phy-

sical fitness for it. Again, they are given the position of watchman, flagman, messenger and similar work, when with proper training their mental energy and physical capacity could make them entirely efficient in much more gainful vocations. Many of these disabled men and women for whom no employer feels responsible, drift from one job to another, constantly dropping to a lower level, until finally they relinquish all effort to work. These are the loafers, the beggars on the corner, the shoe-string merchants on the street, the poor, physically handicapped and mentally debased flotsam and jetsam of our civilization.

The cost alone of this great human wastage should cause every man and woman in this country to pause and think. In Pennsylvania the gross total of workmen's compensation awarded and paid for fatal and disability cases during two and a half years, amounted to \$16,917,000.00, and figures from other states would indicate that considerably more than \$100,000,000.00 annually is disbursed in payment of accident compensation claims throughout the United States.

These eloquent words from the pen of John Mitchell should stir every physician and surgeon in this country to greater effort to meet this problem of the permanently handicapped:

"We are casting valuable workers needlessly on the scrap heap. In my experience as chairman of the New York Industrial Commission, administering the Workmen's Compensation law, I am brought face to face every day with the tragic consequences of our failure to make some provision for restoring economic usefulness, self assurance and renewed interest in life to those victims of industry whose injuries have maimed or disabled them beyond all possibility of returning to their usual occupations. * * * * * For a time, workmen's compensation comes to the aid of the family; then these benefits are exhausted; the little savings of years are swallowed up; the unfortunate man is entirely cut off in the prime of manly vigor from the work he knows so well how to do. He sees no occupation open to him. * * * * * His special knowledge of working processes is gone to waste. He sinks under the weight of his misfortune—watching—the black shadows of destitution fall over his home."

I appeal to you—have we in the past attacked this great problem of the physically handicapped, the result of both accident and disease, with all our energies? Have we not been too content with solving the surgical aspects of this

problem, heedless of the all round processes of human salvage?

SERVICE LEAGUE FOR THE HANDICAPPED

I prophesy that within the next ten years every state in the union now having employees' compensation laws, will likewise enact laws and establish machinery providing for the rehabilitation of these permanently handicapped individuals. Already Rhode Island, Pennsylvania, California and Illinois have adopted rehabilitation laws providing for more or less limited efforts along this line. The Federal Government has enacted the Smith-Sears Bill, which deals with the vocational training of the handicapped from industrial accidents, by cooperating with state efforts. All of this is more or less "piecemeal" legislation, especially the latter law, as vocational training constitutes only about ten per cent of the problem. It is placing the cart before the horse, but nevertheless even this law indicates an awakened conscience on the part of the law makers.

In an effort to work out a practical solution of the entire problem of rehabilitating the physically handicapped, both from accident and disease, an organization has been perfected in Chicago during the last year, composed of leaders in industry and education, a large group of women representing the various social agencies, and a medical board of representative physicians and surgeons of the city. This is known as the Service League for the Handicapped. It has an executive committee made up of fifteen of the most influential business men, with medicine, education and safety engineering also represented. Its Board of Management is composed of delegates from almost every agency in the city dealing with some phase of the problem of the handicapped. Through its connections with the public school system, the universities and many industries, and through its own work shops which are now established, practical re-education of the handicapped for lucrative employment is made possible. It maintains an employment bureau which directly, or through the state employment agencies, is successfully replacing many handicapped individuals in industry. This Service League stands as a half way house between hospital, where the reconstructive surgery is done, and the future employment of the disabled, where his rehabilitation will be completed.

In a few of our Chicago hospitals occupational therapy, physiotherapy and social service departments have been established, and these are the agencies which enable the surgeon to extend his influence over the patient into the economic field. Already we recognize the need of a suitable convalescent center, where the patients after their discharge may continue convalescence under environments which stimulate further effort toward independence.

Thus far the Service League, simultaneously with completing its organization, has accomplished the rehabilitation of 260 permanently handicapped individuals, many of whom were absolutely dependent upon relatives, friends, or on the associated charities. A few were even beggars on the streets. At present it is caring for almost two hundred handicapped cases. The following case examples best illustrate the value of Reconstructive Surgery and the utilization of those adjuncts which assure complete rehabilitation of the physically handicapped:

Case 1. O. C., 19 years old, illiterate Polish boy, speaking very little English. He started to work as a miner almost as soon as he was able to lift a pick. In May 1917, a mine explosion crushed his left leg. Amputation performed at middle of thigh; in hospital six months; discharged with stump healed except a small discharging sinus, which the surgeon told him would heal shortly. Was not fitted with an artificial leg. Industrial Compensation Board allowed him \$1900.00. This money was turned over to his father and step mother, and the boy, with only a few dollars in his pocket, came to Chicago, where a sister was living. He was unable to locate his sister, but secured a room in a cheap hotel, and for three weeks vainly sought employment, but no one wished to hire a one-legged man. Other cripples lived in this hotel, who obtained their living by begging. In order to beg in Chicago, these individuals must procure a license from the city to sell shoestrings or lead pencils or other cheap merchandise, on the street. Most of them conceal the merchandise and do out and out begging, except when a policeman is in sight. Such a procedure is, after all, the licensing of begging. This patient, despondent and moneyless, was about to procure his license, when some one referred him to the Service League for the Handicapped. They sent him to my service at St. Luke's Hospital in January 1920.

Examination of the left extremity showed mid-thigh amputation, posterior scar, with a small sinus at the outer end of the scar. A probe passed into the sinus came in contact with roughened bone. The patient stated that this sinus had never healed since his discharge from the hospital. Cultures from the pus showed a mixed infection of staphylococci and pyocyanus. An x-ray of the stump showed the

lower two inches of the femur consisting of a sequestrum, surrounded by a honeycomb involucrum, so that the femur resembled an aborigine's war club. There were marked osteomyelitic changes in the cortex and medulla. The general examination showed patient considerably emaciated, but with heart and lungs, abdomen, genitalia and remaining extremities normal. Temperature varied from normal to 99.8; white blood count was 10,000, and the urine showed a trace of albumin and occasional casts.

Treatment: A re-amputation was performed, removing three inches more of the thigh. Long anterior and short posterior flaps were made. When the muscles were severed down to a bone, a cylindrical piece of involucrum about two inches long, and forming a cast of the femur, popped out of the wound. The femur was sawed through, two inches above the diseased area. Two Dakin's tubes were placed in the wound and the muscle and skin flaps closed. After treatment consisted of injections every two hours of 15 c. c. Dakin's solution into each tube, continued for ten days. During this period there was a small amount of pus discharged, but the infection rapidly cleared up. Massage started on the tenth day; light pressure on the end of the stump was started at the end of two weeks, and at the end of three weeks, heavy pressure. A temporary artificial limb was fitted at the end of four weeks, and the patient was allowed to walk with an end bearing stump at the end of five weeks. In the sixth week, just before the patient was discharged, he was one of two patients in the ward to develop facial erysipelas. He was quarantined, and was very sick for three weeks. In the ninth week he was measured, and the tenth week fitted with a permanent artificial limb. Because of his experience with a temporary leg, he was able to walk about at once without crutches or a cane. The physiotherapy department was the chief aid in obtaining this result.

During the patient's stay in the hospital the occupational therapy department taught him English and gave him various kinds of occupational therapy. He was anxious to learn photography, with a view of entering the operative end of the motion picture business. Books on this subject were procured, and many of his English lessons were from these books. On his discharge from the hospital at the end of ten weeks, the Social Service Department turned him over to the Service League. The League procured a job for him in a motion picture concern, developing films at night, for \$5.00 a night. In the afternoon he continued his study of English, and took up other studies through the assistance of one of the workers of the League. At the end of three months he was raised to \$6.00 a night. Recently this concern closed down, and this patient secured an excellent job in the same business in Kansas City. This boy was not only reclaimed—he was also Americanized.

Case 2. R. K., fourteen years old, American, while "flipping" freight cars, fell under the wheels and had both legs cut off, the right twelve inches and the left ten inches from the hip joint. Excellent stumps were

obtained as the result of good surgical care in the Illinois Central Hospital, Chicago. After three months in the hospital this boy was discharged, but no effort had been made to teach him to use artificial legs. At his own request he left the hospital after dark, and was carried into his home the back way, so that the neighbors could not see him. For ten months this boy seldom went out of doors, except for an occasional automobile ride, when he was carried out the back way. He was very sensitive about his condition, and his parents were heart broken. The mother frequently remarked that she would much rather her son had been killed. The Service League became interested in this case, and referred him to my service at St. Luke's Hospital.

Examination showed excellent stumps of the size mentioned above. Patient would flinch and complain of pain when stumps were handled. The physio-therapy department gave daily massage, and he was taught to make pressure on the ends of the stumps. At the end of ten days he was fitted with short temporary peg legs, and a month later these were lengthened so that they were approximately two feet long. By means of these temporary legs this boy was able to walk, first with crutches, then with a cane, and at the end of four weeks could walk alone. On his discharge from the hospital this time the boy entered his home at the front door. During his stay in the hospital he was encouraged to fake up his school work once more, which he had decided to drop permanently. At the end of four months he was fitted with permanent artificial limbs of rather short length, but sufficient to make him 5 ft. 2 in. tall. He can walk alone on these legs, but when he leaves the house he uses canes. He returned to school this fall.

Case 3. J. R., 28 years old, American, machinist by trade, enlisted in the "Princess Pat" Regiment of Canada in 1914, and had both legs blown off by a shell just above the knee joint. He was given excellent treatment in Canada, and became an instructor in vocational training of other disabled soldiers. Early in 1920 he returned to Chicago and sought employment. He was unable to find remunerative work sufficient to take care of himself and his wife, whom he had secretly married upon his return. His wife obtained work, and this patient became very despondent over his inability to secure employment. Finally he was referred to the Service League. The League endeavored to secure training for this man as a safety engineer. He was very bitter over the fact that there was no reciprocity between Canada and the United States for the soldiers from Canada who came to the States, and vice versa. Sufficient attention was not paid to the mental state of this patient. He grew discouraged and gave up all effort to become a safety engineer, and again sought employment on his own hook. One morning we read in the paper that he had committed suicide because he could no longer allow his young wife to support him, and no one seemed to care for a disabled soldier. This case illustrates the

need of an organized agency to care for many of these handicapped individuals.

Case 4. H. W., a boy 12 years old, American, one of six children, parents very poor. Was born with congenital absence of entire arms. On the right side there was a small protuberance, and a slightly larger protuberance on the left, but no sign of an axilla. This boy was a pupil at the Spaulding School for Crippled Children, in Chicago, where he had attended for four years. He could do a great many things for himself, such as opening a door by grasping the door knob between his cheek and shoulder. He was a good writer, holding the pencil between his cheek and right shoulder. He wrote on the typewriter, using a long stick held in the same way. This boy was referred to me in June of this year. An x-ray examination showed a rudimentary humerus three inches long on the right side, and five inches long on the left. There was a slight Glenoid Fossa, but the shoulder joints were imperfectly formed. The humerus on both sides seemed closely united to the scapulae. The Deltoid muscle could be outlined, but the biceps on both sides were completely absent.

Dr. John Porter was consulted, and he agreed with me that short stumps could be made by a plastic operation. Two of the best artificial limb men in the city were consulted, and they decided that artificial arms could be attached to these short stumps, if made. I operated on this boy in July of this year, doing first the right arm, and three weeks later, the left. An incision was made from a point where the anterior angle of the axilla should be, down the side of the chest to a point three inches below the rudimentary humerus, outward, backward and then upward to where the posterior angle of the axilla should be. The humerus was found connected with fibrous tissue to the scapula. This was dissected loose up to a point where the humerus seemed to fuse with the glenoid fossa of the scapula. The skin was dissected back over the anterior aspect of the chest, exposing considerable of the pectoralis major muscle. The pectoralis major was split from its insertion downward through its middle portion, and about four inches of the outer half of the muscle freed, its insertion remaining intact. This muscle was sutured over the anterior aspect of the humerus in the place of a biceps, thus forming with the deltoid muscle, a well rounded stump. The lateral flaps of skin were sutured from the axilla down to the end of the stump. It was a very difficult procedure to form a new axilla and close in the denuded area on the chest, but this was accomplished by a plastic flap from the posterior chest wall forming the axilla, and a plastic flap from the anterior chest wall closing in the remainder of the denuded area. The operation on the left side was similarly performed, except a larger amount of the pectoralis major was utilized, and the small denuded area in the axilla was finally closed by later transplanting a prepuce from a circumcision case.

This patient now has a 3.5 inch stump on his right side, and a 5.5 inch stump on his left side, which he

can abduct about 35 degrees and can raise anteriorly about 25 degrees. Through constant attention from the physio-therapy department of the Spaulding School, this range of motion is gradually increasing. He can grasp a heavy stick under both stumps, and we feel confident will be able to wear and utilize the artificial arms which are now being prepared for him. The arms will at least make him look like other boys, and he can hardly wait to have sleeves made in his shirts and coats, something which he has never had. He shows excellent talent as a cartoonist, and is planning to take up this work. I believe he will always draw best by grasping the pencil between his cheek and shoulder, and do not plan to change this method. He should be able to typewrite better by using his artificial arms; he will also be able to carry things. This boy's father was planning to put him in a museum or show, but now the boy is determined to complete his education and become a cartoonist. This is an excellent example of Reconstructive Surgery.

Case 5. B. C., 24 years old, a Polish boy. When seven years of age, while playing on the railroad tracks, was run over by a switch engine and lost both legs just below the hip joints. Disarticulation amputation performed on both sides. Goes about by sitting on a little platform on roller skate wheels, pushing himself with his hands. He was taken up by the Board of Education a few years ago, and arranged to complete his education through the eighth year. Was referred to the Service League for the Handicapped from the Board of Education. Work was found for him at the Raleigh Doll Factory, first at \$20.00 a week, then \$23.00 a week, and now with overtime he frequently makes \$35.00 a week. There is no elevator in the factory, and this boy negotiates four flights of stairs morning and night.

I have examined this boy, and he can be fitted with artificial legs which he could use by the aid of crutches. They would be very clumsy, however, and he is so used to his platform, and can travel about so rapidly on it, that he refuses to attempt the legs. Happy, cheerful, always smiling, "Sunny Jim" would be a most appropriate name for him, but he says everybody calls him Benny, because he is such a little fellow.

Case 6. D. A., male, 25 years old, Norwegian, has a congenital curvature of the spine. At the age of seven he had infantile paralysis, which left him helpless in the lower extremities, which have never developed. His only way of locomotion was to creep. He had incontinence of urine. Three years ago his mother brought him to this country, and two years ago he came to Chicago, where he has a sister living. He had never worked. The Service League took up this case eight months ago. He was fitted with braces which enabled him to stand, with the aid of crutches. Shortly after assuming this upright position his incontinence disappeared. He was taught basket making in his home by the "Shut-In" department of the League. About five months ago he was brought to the work shop of the League in a taxicab. A week

later he appeared at the work shop in a tricycle which he had designed himself and which neighbors helped make for him; he propels this by hand. He lives eight miles from the work shop, and it takes him two hours to make the trip, but since then he has never missed a day being at work at the shop. He is now doing piece work six hours a day, and his pay averages \$14.50 per week. Thus far we have found no means of bettering this boy's physical condition, but he has been changed from an absolutely dependent man to an independent worker. A motor is now being designed for his tricycle, which will enable him to get about more rapidly, and he is planning to enter some business of his own.

Case 7. D. R., male, American, 25 years old, with a spastic paraplegia, the oldest of thirteen children, five living. His father was killed seventeen years ago. Three years ago the mother became paralyzed. This boy had never worked because of the halt in his walk and his defective speech; he had never been given a chance. The Service League referred him to Dr. N. C. Gilbert, who recommended work and speech training. The boy has worked for three months in the League shops at rug weaving, and there is at least 30 per cent improvement in his hands, and his speech is greatly improved. His present earning capacity is \$12.00 per week.

Case 8. R. S., a man 63 years old, a mail carrier, fell fourteen feet three years ago, sustaining three fractures of the right shoulder joint. Had not worked since, because of pain in shoulder and inability to abduct his arm more than 45 degrees.

X-ray examination showed good repair in all the fractures, but the tuberosity of the humerus had evidently been fractured off and united with an upward displacement of about 0.75 of an inch. On abducting or raising his arm the displaced tuberosity would impinge under the acromion process. By forcing it the tuberosity would slip under the acromion, but would cause great pain. This case was referred to me in April 1920. Operation consisted of chiseling off about one-half of the tuberosity. After the wound had healed, this patient was able to abduct and raise his arms completely. Subsequent treatment consisted of massage and exercises, until in July he was discharged with a useful arm. Before the operation he could not sleep, and was a nervous wreck over worry about his arm. He is now, after three years, a productive citizen.

Case 9. F. C., a Polish boy of 18, quit school in the sixth year and went to work. Four years ago, while pushing a truck, he collided with another truck and noticed a slight pain in his arm, near the right shoulder joint. On attempting to raise the arm found it was helpless, but there was very little pain present. X-ray examination showed a pathological fracture through the neck of the humerus, and a large bone cyst present. I operated on this case and found a bone cyst without trabeculae, the walls of which were of egg-shell thickness, made up chiefly of periosteum. The head of the humerus, about one-half inch in thick-

ness, was not involved. A bone transplant six inches long was removed from the tibia, and was fastened in a groove in the shaft of the humerus, the upper end being fastened in the head of the humerus by gouging out a small groove with a chisel. The muscles were resutured about the transplant in approximately their normal position. The arm was held in a cast at right angles to the body for two months, when massage and passive movements were begun. At the end of four months active movements were permitted, and at the end of eight months this boy could raise his arm above his head. By examining the series of x-ray pictures, one sees an excellent proof of the action of Wolf's Law,—the molding and shaping of the graft to the contour of the normal humerus. During this boy's convalescence he was stimulated to take up certain studies, and he became greatly interested in business courses. After his recovery he returned to work as a packer, but went to night school. He is now 22 years of age, and is a bond salesman.

The next three cases illustrate the value of these therapeutic adjuncts in traumatic neuroses:

Case 10. A man, American, age 24 years, fell ten feet on a cement floor injuring his coccyx. After three weeks the surgeon removed the coccyx. When the case was referred to me, this boy had not worked for a year. He complained of numbness in his legs, weakness, inability to walk in an erect position, sleeplessness, and his general appearance and statements indicated a mental attitude of resignation to a state of permanent disability. I placed this man in the hospital, and after three days of careful observation, diagnosed a traumatic neurosis. Treatment consisted of massage and light exercises for two hours a day, and later for four hours a day, and work in the occupational therapy shops, first for two hours a day and later for four hours. This man became interested in the jig-saw, which he manipulated by foot power, and it was his delight to make many scroll designs. At the end of a week he said the numbness and pain in his legs was better. At the end of ten days he went to the park with one of the other patients, who was posted to try and induce this man to row a boat. He rowed the boat for half an hour the first day, and for the next three days was eager to go to the park, and the last day rowed a boat for two hours. At the end of two weeks in the hospital I held a private conference with this patient, pointing out to him that there was absolutely nothing wrong, and that his numbness and pain and sleeplessness had been the result of a mental state. He returned to his old occupation the next day, and has worked ever since.

Case 11. M. R., a man aged 45, laborer in a stone quarry, married, with four children. Entered St. Luke's Hospital in the service of Dr. A. E. Halstead, in August 1919. Two years previously, while blasting rock, a piece of rock fell and struck the back of his right hand. No fractures were sustained, but the hand was badly contused, and remained swollen for several weeks. It was so black and blue that one doctor suggested amputation, fearing gangrene. The

patient refused amputation, but from that day he considered the condition very serious. For two years he had held this hand perfectly rigid. It could not be flexed nor extended, neither could it be rotated, although all swelling and sign of injury had disappeared long ago. Dr. Halstead diagnosed traumatic neurosis, and knowing my interest in these cases, let me experiment with the case.

The first day I spent in obtaining the patient's confidence. The second day I injected the hand and forearm with small amounts of salt solution, using a large sized hypodermic needle. This was painful, but had the psychological effect of creating a little movement in the fingers on the fourth injection. The next day, under gas anesthesia, I found I could manipulate the hand in all directions. It was forcibly flexed and bound down to this position. When the patient awakened I told him over and over, that I had cured his hand. The next day he was so confident that he could use the hand that I removed the bandages and put him to work in the occupational therapy shops. On the sixth day, after two days hard work in the shop, he was discharged with a normal, serviceable hand.

Case 12. L. L., male, American, 40 years old, injured two years previously by a plate glass window falling and cutting a deep gash in his forearm just below the elbow joint, severing the ulnar nerve. He had not worked since the injury. The laceration was sutured without the nerve being repaired, and paralysis resulted. Six weeks later another surgeon opened the wound and repaired the nerve. A year later one of the best surgeons in St. Louis made a second incision over the ulnar nerve, removed considerable scar tissue, removed the nerve from the ulnar groove and buried it in normal muscle tissue. In August of this year this patient was sent to me by the U. S. Employees Compensation Board, which had paid him compensation all this time. His chief complaint was of inability to close his fourth and fifth fingers, and excruciating pain in the forearm about the scar whenever he tried to work or use the arm. It was on account of the complaint of pain that he had remained away from work.

The examination showed that he could flex the fingers about fifty per cent, sufficient movement to rule out paralysis. There were areas of anesthesia in the forearm, but on repeated examinations made at different times, these areas were not constant.

This patient was put to work in the occupational therapy shop, but immediately complained of pain in his arm. After gaining his confidence I operated on him, simply dissecting away the two scars, which had an ugly appearance, and making a nice linear scar. This was done under gas anesthesia, and as soon as he awakened he was told not only by myself but by the internes and nurses, that I had discovered the cause of his trouble, and removed it. The next day he greeted me with, "Doctor, you have turned the trick; I can use my fingers perfectly." After four days he was given light occupation, and on the seventh day was put to work in the occupational therapy shops.

I informed him that he could not return to his home in St. Louis until he was able to do a day's work in the shop. The next day he performed a full day's work, and at the end of two weeks was discharged, completely cured. This man returned to his trade as a carpenter a week later, and I received a letter from him recently saying he had not missed a day from work.

Case 13. This is an arthroplastic on a right temporo-maxillary ankylosis of five years duration, following a blow on the chin, with fracture of the condyle followed by an osteomyelitis. This boy was very melancholy over his condition. Following the Murphy operation of removal of 0.75 inch of the neck of the mandible, with a facial flap from the temporal muscle, I obtained a perfect result with complete opening of the mouth. A facial paralysis developed one week after this operation. Massage and facial exercises were given daily, and occupational therapy was used to overcome this patient's despondency. He was discharged from the hospital at the end of three weeks, but reported back for his massage. Today, four months after the operation, the facial paralysis has completely disappeared, and the boy has again returned to his school work.

Many other case examples of amputations could be given. These are old amputations which had never been fitted with artificial limbs. They were either beggars or holding mediocre jobs. Through the efforts of the Service League artificial limbs have been obtained, and these unfortunate persons have been placed in lucrative positions. One case of a lady, fifty years old, a trained nurse, lost both her legs just above the ankles ten years ago. She had become dependent. Her stumps were sensitive, and for this reason she would not attempt artificial legs. Massage was applied until she was convinced that the stumps were no longer sensitive, then two artificial legs were obtained. By the end of two weeks this woman, who had gone on crutches for ten years, was walking about only with the aid of a cane. Four weeks from the day she arrived in Chicago, through the assistance of the League she was placed in a position in one of our hospitals, assisting in the surgical dressing department.

I have had several cases of chronic osteomyelitis with large discharging sinuses, in patients who had ceased to be under the attention of any physician. These patients were neither physically nor mentally able to work. One of them, a man 45 years old, with a wife and five children, recently came under my care, four years after his injury, with an old osteomyelitis of the tibia, and

a large ulcer over the lower extremity. He had drawn \$12.00 a week from the insurance company, and his wife was forced to work to support the family. This is an example of many of the old chronic cases which have become pensioners on insurance companies. Three different efforts, at large expense, had been made by this company to clean up this case, but each time it was a failure. Naturally it seemed cheaper to pay this pension than to waste any more money on operations.

A radical cleaning out of the diseased bone, with complete dissection of the ulcer, followed by Dakin's Solution, is rapidly cleaning up this condition. The occupational therapy department has put new interest in life into this man, and he can hardly await his discharge from the hospital in order to return to work.

These cases demonstrate that reconstructive surgery does not differ from any other type of good surgery, but they do illustrate that if the surgeon desires to obtain a good economic end-result, he must use such therapeutic adjuncts as physio-therapy and occupational therapy, and must have close contact with some agency which will obtain employment for and supervise his case until rehabilitation has been completed.

In order to salvage the human scrap heap in every community, our profession must awaken to its responsibility. Physicians must take the lead in establishing these prevention and reclamation services.

DISCUSSION

DR. A. A. LAW, Minneapolis: Personally it has rarely been my privilege to hear such an interesting, philosophical, and instructive paper so splendidly presented. I think every one of us is more or less familiar with the different efforts that have been made by great corporations to rehabilitate their injured employees. Since the Great World War we are all realizing the necessity of reeducating and helping the wastage of that war. I saw in the great French Facio-Maxillary Reconstruction Hospital at Beauvais, soldiers who had received terrible wounds, in some cases their faces were literally blown off. There was nothing more encouraging than to see the reconstructive surgical work done here by the surgeons and by the dentists in this hospital. The prosthetic, cosmetic and mechanical work done was remarkable. These Facio-Maxillary surgeons restored these terrible remnants of war to some semblance of human appearance. The excellent surgical and prosthetic work done by these surgeons showed us that not only did they rehabilitate these men physically but they built up their morale which they needed more than any-

thing else to permit them to go back into the society of their fellows without feeling they were monstrosities and a burden to themselves and to other people.

In the Hospital Center of Allerey, Saône et Loire, with a capacity of 25,000 beds, as soon as many of the men could be turned out, they were sent to a "Convalescent Camp" where efforts at rehabilitation were begun. They were put through exercises and through calisthenics and their morale was built up. One of the necessary things in war is that the wounded soldier must be reeducated and have instilled into him the morale which gives him what the military man calls "The will to fight". As a result of this training it was possible to return eighty per cent of the wounded back to the fighting lines.

This summer in France and in England I studied some of the efforts that are being made by these countries to rehabilitate these men. The United States government, recognizing the necessity for this rehabilitation, has done and is doing a wonderful work; this is centralized in the Public Health Service which is responsible for the work being carried on and where men are being reeducated and retaught mentally and physically. Dr. Mock has emphasized the necessity of the morale of these men being built up, of reteaching them to do things which put them in a position to successfully compete with their fellows who are more fortunate than they themselves.

It still remains for most great corporations to put into effect the lessons they have learned from the United States government. The most dramatic part of Dr. Mock's paper was the presentation of the large number of economic and industrial injuries which occur in this country annually, he has shown us how very large this is, in comparison with the injuries resulting from the late war. The vast number he mentioned is enough to make us pause and think, fortunately some of the great corporations are doing the same and are seriously taking this matter up. They are putting in social services, installing a corps of trained doctors, surgeons and nurses into their great organizations, teaching them that following industrial injuries their employees must be reeducated, and emphasizing the enormous economic saving resulting from that reeducation.

We are glad to hear that so many states have appreciated the necessity of reeducating men following industrial injuries and have formulated laws to that end.

We have Workmen's Compensation Laws in most of the states, some of which are good, some bad, many of them in the transition stage. It remains for the government or state to control and put into these Workmen's Compensation Laws a clause making it imperative upon the state or upon corporations to reeducate men who are injured while in their employ.

DR. E. S. JUDD, Rochester: We seldom, if ever, heard of reconstructive surgery before the war, and yet as Dr. Mock suggests, this class of surgery does not differ from the emergency and reparative surgery of the past century. With the tremendous amount of

this kind of work that has come as the result of the war, a very great advance has been made by Dr. Mock and others who are devoting much time to its many problems. It was an interesting experience to visit some of the army hospitals a year or more ago and see three hundred or more peripheral nerve injury cases under the care of one surgeon. This certainly was more material of the kind than could be gotten together in any other way. It gave these surgeons and their staffs an opportunity to work out the best methods to follow. It soon became known that an end-to-end suture of a peripheral nerve was the best method of procedure, and that where it could be accomplished, in the majority of cases there would be a restoration of function. I was also interested to find that some of these surgeons could estimate fairly accurately from the nerve involved about when the return of function might be expected.

And from this great amount of material much progress can be expected from such work in the substitution of muscle function. I believe that at present in cases of musculospiral injury, if the destruction is so extensive as to take away a considerable portion of the nerve, it is better to restore the function by substituting some of the muscles of the forearm than to attempt to graft nerve tissue or wait for it to regenerate. In many traumatic as well as congenital and paralytic deformities of the extremities, in which there are some muscles capable of functioning, these operations are being most satisfactorily carried out.

Those having charge of wards of osteomyelitis or empyema patients, from the data which has been collected from these cases, will undoubtedly have improved the treatment so as to make a better convalescence and bring about a more complete restoration of function.

While the points I have mentioned regarding the technical phases of the treatment must be regarded as important, at the same time they are almost secondary to the extension of the care of the patient by the surgeon into the economic end result. And so far as I know this part of the work has not been carried out systematically until lately. Dr. Mock certainly deserves great credit for his part in the work, and the cases he has reported here show what can be done.

While it may be that the reclamation services will at first be confined to certain cities, I fully agree with Dr. Mock that he has shown by his work in Chicago that a reclamation service is feasible in any community.

DR. H. WINETT ORR, Lincoln, Nebraska: One is tempted to applaud rather than discuss this excellent paper of Dr. Mock.

There are one or two points I would like to refer to briefly. We have been accustomed to think that death is the ultimate calamity for every human being. I have seen even in children death come as a welcome relief at the end of a life of disability. A thing we do not ordinarily appreciate, and perhaps has not been sufficiently emphasized, is that a large percent-

age of all disability rests upon the shoulders of some member of our profession. This is true particularly of surgeons and specialists. The custom has been common to blame the general practitioner for failure to get patients to the specialists in time. We do not often think that every case of hunchback is a neglected patient. There should never be a hunchback. Every case of tuberculous lesion of the spinal column should be treated early to prevent deformity. The same is true of infantile paralysis and of tuberculosis of the hip.

One of the able speakers this afternoon stated that the future of surgery to a large extent rested upon more accurate methods of diagnosis and better technique for operating. He stopped there. He should have added that the future of the patient rests largely upon better postoperative care.

We were fond of saying before the war that we as a nation, in case we were attacked or threatened, would spring to arms over night and crush the enemy. When we sprang to arms at the proper time we saw how flat footed, stiff jointed and otherwise crippled up we were. We could not spring at all. As a matter of fact, the surgeon-general in a report just issued states that 600,000 mechanical difficulties were found in the examination of those who were drafted, and of these 600,000, 22,000 were barred from military service on account of bad results after fractures. These are good things for surgeons to think about. I want to use an illustration from military experience.

In the treatment of compound injuries of the upper arm and elbow, it was my privilege in one of the hospitals abroad to have seen 700 cases that came in from the front with their arms in straight Thomas splints, not pronated. Every such arm, no matter how badly injured was flexed at the elbow and the hand supinated. We are greatly indebted to Sir Robert Jones, of Great Britain for what he has taught us in this regard. One of the fundamental principles of reconstructive surgery is that all these things can be settled on principle. We get too much in the habit of dealing with patients as individual problems. We should remember the principles that will help to secure relief for all patients.

One point I desire to emphasize is that badly crippled patients must not be considered hopeless. Almost any patient can be relieved, no matter how severe the disability may be when you begin, or how great it is when you finish. If he can be relieved, you often start him on the way towards the reclamation that Dr. Mock has spoken of.

DR. MOCK (closing the discussion): It is surprising how readily laymen grasp the idea of reclaiming the handicapped when you present principles to them. I would suggest that as you go home you appeal to your business men, your Chambers of Commerce, and your other civic organizations about the possibilities of reclaiming the great human scrap-heap in your midst. You will be gratified by their response.

SOME UNSETTLED PROBLEMS IN THE MANAGEMENT OF RENAL TUBERCULOSIS*

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Looked at broadly, the development of our knowledge of renal tuberculosis within the last ten years has been satisfactory. The relative frequency of the disease, its accurate diagnosis and its satisfactory operative treatment have been developed progressively and soundly. Perhaps the improvement is nowhere better shown than in the operative mortality. Prior to 1900, the mortality of nephrectomy for tuberculosis as reported from the great European Clinics was at least 25 per cent. In the decade between 1900 and 1910, the operative mortality of the leading operators in this country was not above 10 per cent, while in the decade from 1910 to the present time, the mortality in the great clinics has fallen to between two and three per cent. Considering the technical difficulties of the operation of nephrectomy, the proximity of important structures including great blood vessels, and the general rather poor condition of these patients, this is a highly satisfactory showing.

Almost we might be satisfied if we did not turn our attention to the study of the end results. But the study of the results in several large series of cases taken from various clinics where the results are known after a lapse of years shows that we cannot yet rest from our labor. Roughly speaking, it shows the following situation. Of the 97 to 98 per cent of the cases who leave the hospital after nephrectomy for tuberculosis, about 25 per cent die of urinary tuberculosis. Of this 25 per cent, one-half die within the first two years and the balance within five years.

It is to this group of cases and particularly to the 10 or 15 per cent who die within the next two years following operation that I particularly want to draw your attention. Clearly these people must either (1) have had tuberculosis of the remaining kidney though unsuspected, or (2) they must have developed it very promptly after operation.

*Read before the Southern Minnesota Medical Association, Mankato, November, 1920.

1. THE EVIDENCE UPON WHICH THE DIAGNOSIS OF UNILATERAL DISEASE MUST BE BASED

For the moment I will exclude the cases in which bilateral tuberculosis is known to exist and yet in which operation upon the worse of the two kidneys is thought desirable. Confining myself therefore to the cases in which it is believed at the time of operation that the tuberculosis is limited to one kidney, that opinion must be based upon the following reasoning:

1. Evidence may be collected to show that the non-tuberculous kidney is sound in all respects. In order to do this we must collect the evidence of normal urine and good function.

2. We must believe that though the remaining kidney is not sound, it is not tuberculous. In this group of cases there are three general types of trouble, (a) the toxic nephritis of Alberman, (b) infection of the kidney with some organism other than the tubercle bacillus, and (c) chronic nephritis.

(a) *Toxic nephritis.* It is my impression that this condition was first carefully studied by Alberman. At all events he called attention to the fact that in the presence of unilateral renal tuberculosis there was occasionally found a condition in the other kidney which he described as toxic nephritis. It is characterized by the presence of albumin, of casts, generally, of pus and, occasionally, of blood, but the urine is always free from evidence of infection and particularly the tubercle bacilli. He demonstrated experimentally on animals that the feeding of kidney substance would produce a picture similar to that described, a condition which rapidly disappeared after the withdrawal of the abnormal diet and which, in his patients, rapidly disappeared upon the removal of a tuberculous damaged kidney. In my own experience, cases which I could demonstrate beyond doubt to be of this type have not been common, but I have seen a sufficient number which correspond in every particular to satisfy me that the condition exists. On the whole it has, I think, received less attention than the careful work of its sponsor deserved.

(b) *Infection of the kidney with organisms other than the tubercle bacillus.* In my own experience this condition has not been common. It has on the whole been very striking that the presence of a tuberculous infection in the uri-

nary tract tended to discourage other types of infection. This I continue to believe in spite of a recent paper by Barney tending to show that in the presence of urinary tuberculosis other organisms are commonly found in the urine. The mere presence of other organisms by no means proves infection and the study of a pretty large number of cases has shown the striking absence of mixed infection in the vast majority. On the other hand, it is a possibility which must be entertained. Of the organisms which may be found, the colon bacillus is the most common and we shall have what is probably accurately described as a colon bacillus pyelonephritis on the side opposite to that showing tuberculosis. As a rule, the function of these kidneys is relatively good, but they are not likely to show improvement after the removal of their fellow upon the opposite side. In fact, the extra strain thus thrown upon them may well cause suspension of their function and make operation exceedingly hazardous.

(c) In order to make this list complete we ought perhaps to include chronic nephritis, though as renal tuberculosis is notoriously a disease of the first half of life, chronic nephritis has, in my experience, been a rare complication. The diagnosis of chronic nephritis should present no grave difficulties, at least no graver than those present under other circumstances.

Having demonstrated the apparent soundness of the remaining kidney, or the presence in it of any of the above described conditions, can we say with reasonable certainty that our knowledge is complete? Unfortunately the answer to this question is in the negative. There is no method now at our disposal which will enable us to diagnose "closed" tuberculosis, by which I mean not that form of tuberculosis of the kidney from which closure of the ureter has resulted, but those tuberculous lesions of the kidney which are contained entirely within the renal parenchyma and communicate at no point with the renal pelvis. These cases undoubtedly exist. They, equally undoubtedly, show a urine indistinguishable from the normal or within normal limits.

The possibility of diagnosing renal tuberculosis depends upon the demonstration of two factors: (I) the presence of inflammatory reaction, that is to say pus with or without blood, and (II)

tubercle bacilli. The demonstration of either of these factors alone does not prove tuberculosis. It is notorious and has been verified by many observers that tubercle bacilli may appear in the urine without a lesion of the kidney. It is, of course, true that pus in the urine without tubercle bacillus cannot be regarded as a demonstration of tuberculosis. Many years ago Alberan, while at work on the problem of toxic nephritis, attempted to show that in "closed" renal tuberculosis some slight abnormalities of urine always existed but he was only able to show the very constant presence of small quantities of albumin, a demonstration which is quite insufficient to a diagnosis. It therefore follows that though we may find an apparently normal kidney on one side or a kidney showing evidence of a lesion interpreted as toxic nephritis we are still unable to say with scientific certainty that this kidney has not a lesion, and an active one, produced by the tubercle bacillus.

What importance shall we assign to this hole in our diagnostic accuracy? If we take into consideration the existing knowledge of the natural history of tuberculous lesions of the kidney we must almost inevitably conclude that the presence of a lesion in the remaining kidney will lead inevitably to a fatal issue. Evidence is at the present time, lacking to show that a tuberculous lesion in the kidney ever heals except by removal of the kidney whether by nature (autonephrectomy) or by art. A careful study of the development and propagation of tuberculosis within the kidney such as was recently published by Crabtree¹ makes us all the more willing to assume the possibility of healing. Some very recent work by Forni² may prove of interest in this connection. He has apparently shown that if tubercle bacilli are introduced into the kidney and the kidney on the other side is immediately removed, the outlook for the infected kidney is very much better than if the kidney on the other side is allowed to remain. This is, of course, similar to the results alleged to have been obtained by the removal of the worse of the two kidneys. My experience, however, with this latter procedure has been sufficient to make me skeptical in regard to its utility, and I do not at the

present time intentionally remove one of two tuberculous kidneys. I regret that I am unable to suggest a method by which we can avoid overlooking these closed lesions but I think it important to call attention to this ever-present possibility and to point out that the improvement in our results would be greatly aided by further study of this question should it result in its solution.

II. THE DEVELOPMENT OF TUBERCULOSIS IN THE REMAINING KIDNEY AFTER OPERATION

Of the patients who after nephrectomy, die within a few years, of tuberculosis of the remaining kidney, there is a sufficient group in which the demonstration of the original soundness of this kidney was sufficiently complete to make us at least consider seriously the possibility of postoperative infection. I take it that we all of us believe that in the majority of cases the infecting agent in renal tuberculosis is blood-borne. Now clearly the conditions attending operation are such as to make the driving of bacilli, perhaps in quantity, into the blood stream, a not remote possibility and the development of an occasional case of miliary tuberculosis following operation makes it clear that this does, in fact, occur. Furthermore, there is a group, of cases which, following nephrectomy show high temperature, much increased pulse rate and the other evidences of a sudden acute infection. This rapidly subsides; there is no clear evidence of infection with any of the organisms commonly introduced from without and we might not improperly regard them as evidence that there was driven into the circulation at the time of operation either numbers of tubercle bacilli or their toxic products. From this I think it follows that in a certain number of cases we must expect renal tuberculosis of the remaining kidney as an unavoidable consequence of the operation. On the other hand, it is not clear to me that there is anything which we can do to avoid its occurrence and it must therefore be charged off to depreciation.

Now there is another possibility of infection occurring after operation or at least after the patient has come under observation, to which I want particularly to call your attention. I refer to the possibility of infection of the remaining kidney as a consequence of the measures taken to arrive at an accurate diagnosis. Diag-

¹Archives of Surgery, November, 1920, Vol. 1 page 581.

²Centralblatt für Allgemeine Pathologie und Pathologische Anatomie, October, 1920, Vol. 31, No. 3, pages 66 and 67.

nosis of sufficient accuracy to warrant operation depends inevitably upon cystoscopy and ureteral catheterization. The majority of these patients have tuberculous lesions of the bladder secondary to their renal disease. In many of them the technical difficulties of the examination is great and trauma nearly or quite unavoidable. Were we dealing with any other form of infection of a unilateral type we should be gravely conscious of the danger of infecting the remaining sound kidney. This possibility has, I think, been, to some extent, overlooked and though it may be regarded as inevitable to accurate diagnosis we must overhaul our methods and be sure that they expose the patients to the slightest possible danger of infection. Some years ago I called attention to the fact which I was then, as now, unable to satisfactorily explain that, in cases particularly of long standing unilateral renal tuberculosis, the ureter on the sound side commonly showed a definite and even considerable degree of dilatation. It has been suggested that this phenomenon may be due to the hypertrophy of the bladder wall consequent upon frequency of urination and that with the hypertrophy of the fibers surrounding the ureteral orifice, increased resistance to the descent of the urine is produced. What ever may be its cause it is a fact that should not be overlooked because we have here some degree of renal and ureteral retention, conditions which we know are commonly antecedent to infection. My own knowledge does not permit me to say whether or not these cases do in fact show a greater tendency to infection of the remaining kidney after operation but the point is at least worthy of further investigation.

At this point the question may be raised whether or not infection with the tubercle bacillus ever ascends from bladder to kidney. This point does not seem to me as yet clearly settled but the pathological evidence seems to show that it does occur in the cases in which unilateral tuberculosis is converted into bilateral tuberculosis without the intervention of the surgeon. Most well-informed pathologists believe it to be a definite possibility and the clinician is in no position to deny the soundness of their view. From this observation it appears to me to follow that we should surround our instrumental study of these patients with the

greatest precautions and above all we should avoid any multiplications of cystoscopic examinations beyond the absolutely necessary. This point does not seem to me to have received sufficient attention. I was struck by a paragraph in a recent article from a most skillful surgeon definitely advising multiple cystoscopies in the diagnosis of this condition. With this advice I must take issue. By all means let us make such examinations as are necessary but only with the full realization of the fact that each examination is a definite trauma and that we cannot say at what point fatal damage may be done. If we study these patients to a full extent by general physical examination, careful study of the urine and roentgenological evidence, we can, in most cases, make a diagnosis of renal tuberculosis without cystoscopy. We must then determine whether or not the patient has a non-tuberculous kidney concealed about his person and whether it is functionally capable. It should be possible in most cases to obtain this evidence as a result of one examination of the bladder. Beyond this we cannot go; without the cystoscopic verification our whole procedure is in the air but I would warn against multiple, unnecessary or ill-advised and roughly executed examinations. They may well be at the bottom of some of the cases which rapidly develop disease of the remaining kidney and die as a result. It is my present opinion that by attention to this detail we shall do more to diminish the number of people belonging to the unfortunate 10 or 15 per cent not importantly benefited by operation.

DISCUSSION

DR. WILLIAM F. BRAASCH, Rochester: This Association is certainly to be congratulated on the privilege of listening to the able paper of Dr. Cabot. It represents an experience of many years in dealing with this subject, of which he is one of the acknowledged leaders in America.

I wish to endorse his recommendation that every effort should be made to lessen the pain caused by cystoscopy of patients suffering from renal tuberculosis. This can usually be done by employing the principles of regional anesthesia. Under Professor Labat's instruction, we have taken advantage of such anesthesia and we now employ it daily in cystoscopy of patients with intolerant bladders. Sacral anesthesia, or parasacral anesthesia will render the urinary tract insensitive to pain and can be employed not alone in cystoscopy but also in the treatment of stricture of the urethra, litholapaxy or any work on the perineum.

It is a well-known fact that the late mortality following nephrectomy for renal tuberculosis is highest during the first year. Dr. Cabot's explanation of this early post-operative mortality is of great interest. It certainly can hardly be ascribed to a direct result of the operation and the question naturally arises can it be due to disease in the other kidney? It has been my observation, however that the majority of patients who die within six months or a year following nephrectomy, and where the other kidney was found on clinical examination to be normal that they did not die of renal insufficiency. I am under the impression that with many of these patients death is due to other diseases such as general tuberculosis, meningitis, pulmonary tuberculosis, etc. However, we must always be careful to investigate for every evidence of disease in the other kidney.

In a series of cases observed some time ago, we made guinea pig inoculations with the urine from the other kidney and the results obtained were negative in every case. We showed conclusively that in a large series of patients with evident unilateral renal tuberculosis that the other kidney was not diseased. I am under the impression that even though a small amount of pus is found in the ureteral specimen of urine from the other kidney, it is advisable to go ahead and remove the diseased kidney. When one kidney is found to be badly diseased, even though there is a question of infection in the other kidney, nephrectomy of the former kidney is advisable, and might give temporary benefit at least. While it is possible that the other kidney may become infected by the trauma of careless or frequent catheterization, it is necessary that evidence of infection and an estimate of renal function of the remaining kidney be ascertained.

In regard to dilatation of the ureter on the other side, to which Dr. Cabot has called attention, it is probable that this is often explained by ascending ureteritis which will not involve the kidney. After the removal of the diseased kidney the cystitis will usually disappear and with it the urethritis on the well side. On subsequent cystoscopic examination the previously dilated ureter has in a number of cases been found to have become normal.

DR. E. S. JUDD, Rochester: This Association is indebted to Dr. Cabot for his broad and instructive paper on the management of renal tuberculosis. I was much impressed with the fact that he considered frequent and repeated examination in these cases not only unnecessary but often harmful.

It is interesting to note that he feels as we all do, that it is essential to have special instruction in the methods that must be employed in making these examinations. Special instruction and training is important because it helps to develop experience and judgment so that these repeated examinations may be dispensed with.

It seems that even the most experienced urologists have difficulty in making sure that the disease is unilateral. I feel that if there is a reasonable doubt

in certain of these cases, it is advisable to make an incision and explore the supposedly normal kidney before removing the diseased one. To be sure, a slight infection might be overlooked, but this would probably be of no consequence, while to remove the kidney which is bound to be infected and then find that it had the better function of the two, is a very serious error. I believe that an apparently normal kidney will often have a slight infection which is not demonstrable. If one kidney is extensively involved and the other slightly, in certain selected cases it may seem best to remove the one which is most extensively involved, if the process is active at the time. Not many patients with evidence of bilateral renal tuberculosis will get well by this procedure, and yet in some instances this has seemed to help.

I believe that in some cases that are diagnosed as acute renal tuberculosis, there is really a general biliary tuberculosis at the time, and that we do not become aware of the general nature of the disease until after the kidney has been removed. It is possible that the general infection is brought about by the operation on the kidney, but I do not believe that this is often the case. I have been impressed with the number of cases that presented renal tuberculosis in whom roentgenologist has noticed old healed or sometimes active tuberculosis of the lungs, although these same patients have no pulmonary symptoms. Thirty-eight per cent. of our cases of renal tuberculosis in 1919 had definite chronic or healed pulmonary tuberculosis that we could demonstrate. This has raised the question with me whether all sorts of tuberculosis may not be primary in the lungs, although frequently more evident somewhere else.

The existence of other tuberculous lesions at the same time have made surgery for renal tuberculosis rather unsatisfactory. If the kidney removed contains the only focus of tuberculosis, the results are most gratifying.

DR. G. SCHMIDT, Lake City: In listening to this able discussion the question which has occurred to me is this: Suppose I was the patient and had one kidney out; what would I want done to myself? I thought of three things. First, to be fed properly to fit my body to take care of or overcome the trouble, second, I would remove all sources of toxemia which poison the blood. (I think the large intestine is the most overlooked source of this trouble); third, I would want the 2,000 candle power light and the Alpine sunlight used on myself. With these three things used I would expect to have a better chance to get well. There is nothing better that I know of that can be used.

DR. R. E. FARR, Minneapolis: I enjoyed the exposition of this subject by Dr. Cabot very much, and I rise simply to mention two points. First, I operated on a case a few years ago that had tubercle bacilli in one side and a lesion that we could feel by vaginal examination. We removed the kidney, examined it, and found that it was absolutely normal in every respect. The kidney was examined

thoroughly by Professors Robertson and Bell at the University, and they were not able to find tuberculosis or a healed process in that kidney, but, about two inches of the ureter at the bladder were infected with tuberculosis, which would be in a sense evidence that we do have an ascending infection at times.

Another point I thought of was brought out by the fact that I had operated on many patients years ago when I was doing cystoscopic work with the patient in the knee-chest position, and collecting urine through an obliquely cut cystoscope of the Kelly type, and not catheterizing the ureters. Three of those women have remained well for fourteen, fifteen and sixteen years respectively. Is it not possible that it would be well to collect urine in this way in women who are suspected of tuberculous kidneys? Caudal anesthesia is wellnigh ideal for cystoscopic work. Providing it proves safe it is sure to become the anesthesia of choice.

DR. CABOT (closing the discussion): Dr. Braasch did not understand me in regard to the group of cases I was discussing. I postulated that they did die of tuberculosis of the other kidney. There is another group which died of tuberculosis elsewhere following operation on the kidney just as they die following operation for tuberculosis elsewhere. I was leaving these out of account. I was dealing only with a group of cases which, supposed to have one sound kidney, following removal of one tuberculous kidney, died of tuberculosis of the remaining kidney within two years.

I do not know quite what to say in regard to the possibility of closed tuberculosis being discovered with certainty by guinea pig inoculation. I am quite satisfied that there is a group of cases of closed tuberculosis in which the tubercle bacilli do not enter the urine except in very small numbers. Of course, it has been known for a long time that patients with no tuberculosis of the urinary or genital tract, but with tuberculosis in other parts of the body, will more or less constantly excrete, if that is the proper word, tubercle bacilli. They will have tubercle bacilli in the normal urine, and I am not clear that the tubercle bacilli in closed tuberculosis appear in the urine in any greater number than may be found from tuberculosis elsewhere.

I am quite in accord with what Dr. Judd has said about exploration in cases of doubt in regard to the soundness of the other kidney. There is a goodly group of cases in which, with the best efforts you can make, you are still unable to satisfy yourself in regard to the condition of the other kidney. Some of the cases frankly in my hands are not catheterizable. I cannot find an opening on the other side of the bladder into which I can fit a catheter. This difficulty is bound to occur even in the hands of those of wide experience, and personally I have depended more upon the condition of the ureter than upon the condition of the kidney upon the doubtful side. I have seen so many cases of rather early tuberculosis of the kidney in which I was utterly

unable to discover any abnormality in the kidney by examining it with my fingers. On the other hand, in that same group of cases the ureter is grossly pathologic, and it has been my custom not to explore the opposite kidney, but to make a muscle splitting incision in the iliac fossa, slip the finger down and feel the ureter. If the ureter is sound, I will take a chance on it. It is a little hit or miss, but I think it exposes the patient to somewhat less operative trauma than exploration of the other kidney.

I remember well seeing this happen years ago before cystoscopy: One of the most skillful surgeons I ever saw cut down upon a kidney in the presence of frank tuberculosis with tumor, etc., on one side. He put in his hand, felt the other kidney, and said to his house physician, "That is a perfectly good kidney," and he took out the kidney which he had exposed and which contained all the secreting substance the patient had. What was left on the other side was a caseous kidney with normal outline. There was not a milligram of kidney substance left at the end of the operation. I am in doubt of my ability to be sure of the condition of a kidney thus examined particularly in the early stages.

In regard to the question of operation in bilateral tuberculosis of the kidney, that is an open question, but we ought not to be too pessimistic. It was apparently shown fairly satisfactory by a rather small group of cases some years ago with advanced tuberculosis on one side and a little tuberculosis on the other, that removal of the worst kidney helped the kidney which was left; that apparently the antibodies developing in the body helped out the other kidney.

Just the other day a most interesting article appeared by an Italian experimenter in which he showed that if you inject tubercle bacilli into the kidney of an animal and leave both kidneys in, there will be developed tuberculosis at the site of the injection. If you inject tubercle bacilli into a kidney, and take out the other kidney, tuberculosis will not develop. The work must be repeated, but it is interesting as tending to show that by throwing more work on the kidney and by increasing its blood supply, you help it to meet the attack of the tubercle bacilli. It may induce us to go back more to the view that we should operate in the presence of advanced tuberculosis on one side and early tuberculosis on the other. I am satisfied that is still in the debatable ground, and I certainly shall go over my cases and my evidence again to see whether I should reverse my recent decision not to operate in the presence of bilateral tuberculosis.

I am very much indebted to the gentleman who discussed the question of general treatment. There is no doubt whatever of its importance, and any of us bloodthirsty surgeons, who will take out a kidney and kiss the patient goodby without providing for future treatment of that patient, have not done our duty. It is perfectly clear that what he suggests is right. I would add one thing more which I think is of first class importance, and that is tuberculin. Since we

have made the use of tuberculin a routine and it is now nearly fifteen years, we have had very much fewer slow healing wounds, very much fewer sinuses, and I think a higher percentage of cures. Of course, that is mere guesswork because our technic has improved; many things have contributed to give us better results, but I am sure we have less sinuses, cleaner healing wounds, and fewer wounds which break down weeks and months afterwards or that come back to bother us with our own inefficiency. General treatment after operation must be put in advance of everything else.

DENUDATION OF INOPERABLE CANCER, AN AID FOR EFFICIENT RADIO- THERAPY*

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There is a class of cases of recurrent carcinoma in which the surgeon has practically abandoned all hope and efforts. It is difficult enough to eradicate a primary growth but when recurrence has taken place surgical intervention is usually regarded as futile. It is to this class of apparently hopeless cases I desire to call attention, and to make suggestions as to what can be done for them. If we can save only one in one hundred we shall have accomplished something.

As a rule, the surgeon will refer such a case to the roentgenologist for x-ray and radium treatment, not because he expects a cure, but, because he does not wish to deprive the patient of the hope that something more can be done for him; and also because he is aware that radiotherapy is beginning to accomplish results, which in former years were thought impossible.

In the past four years I have selected for investigation a series of about 50 cases and have come to the conclusion that we are entirely too pessimistic and that a percentage of these cases may be benefited and possibly cured.

It is well known that superficial malignant growths such as epitheliomata may be benefited by radium or x-ray treatment.

Reports from reliable sources of such cases prove the efficacy of this treatment. Deep seated carcinomata however do not yield in the same degree to deep therapy. What is

the cause of this? We must seek the explanation in the physics of radiotherapy.

Radium as well as the x-ray produces rays of various wave lengths and penetrating power. In the case of the x-ray, the wave lengths depend upon the vacuum of the tube. The hard rays are more penetrating. Radium emanates three varieties of rays, the alpha, the beta, and the gamma rays. The alpha rays constitute about 91 per cent of these rays, the beta about 7 per cent, and the gamma only 2 per cent. The alpha rays cannot be considered in their action in radiotherapy since they are absorbed in the glass receptacle in which the radium is suspended. Rutherford states that 6/1000 inch of aluminum or a sheet of thin writing paper will absorb all the alpha rays. The beta rays are more penetrating and nearly all will be absorbed by 5 m.m. of aluminum or one m.m. of lead. These rays are useful in radiotherapy, and their action may be controlled by proper screening. The gamma rays are very penetrating and these are the rays that play the most important part in radiotherapy. The knowledge of the penetrating power of each variety of these rays is a practical guide in the proper application of radium and the x-ray.

For a rough working rule we may say that the thickness of matter required to absorb a certain type of rays, is inversely proportional to its density. It requires for instance 20 m. m. of aluminum to absorb as many rays as 1 m. m. of brass. The density of tissues also vary in the absorptive power of rays. Skin will filter more rays than fat, and bone more rays than skin. Shadows on the photographic plate of different substances of equal thickness give us an approximate index as to their density. The density of any substance depends upon close packing of molecules of which it is composed. Metals such as gold have a greater density than wood, or flesh, because the gold molecules are packed closer.

We have already stated that the alpha rays are not to be considered in the treatment of cancer. The beta rays are about 100 times as penetrating as the alpha, and the gamma rays are again from 10 to 100 times as penetrating as the beta rays. Are we at present utilizing these rays to their full extent? I will state unhesitatingly that we are not. We are wasting the greater part of the radioactivity of these rays.

*Read before the Southern Minnesota Medical Association, Mankato, November, 1920.

at least when we apply radium to a deep seated growth.

But it is not the only factor playing a part in their action. Two other factors must be considered: first—the depth of the pathological tissue; second—the vulnerability of the pathological tissues as compared to the normal tissues.

The skin, fat and muscles which cover the deep seated growth, are barriers to the penetration of the rays. They act as filters in addition to the strong artificial filters of lead and aluminum which the operator usually employs, in order to prevent burns of the skin. There is another factor which diminishes the action of the radium. In applying a radium capsule of 50 mgr. on the surface of a wooden block one inch square, we obtain only the rays which penetrate downward toward the block, and lose all the rays which emanate upwards and sideways (Fig. 1). If the same capsule of 50 mgr. were inserted into the tumor itself, the radium rays would pene-

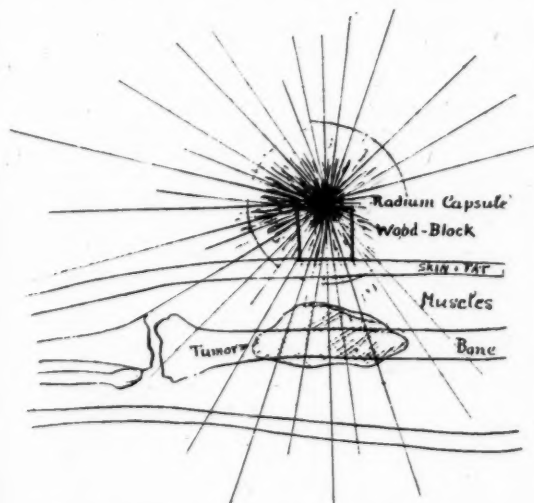


Fig. 1. Action of Radium diminishing with distance and filter.

trate the tissues from every surface of the capsule and effect the growth in all directions.

I have come to the conviction that deep seated cancers do not yield to treatment of the radium because the skin, fat and muscles are distinct barriers to the action of the most effective radium rays—namely some of the beta and a large portion of the gamma rays.

I have, with the cooperation of Mr. G. W. Warner, a physicist to the Ryerson Laboratory in the University of Chicago, published some experimental work, which proved that human skin, fat and muscles absorb large quantities of the x-ray. This fact suggested the idea that if

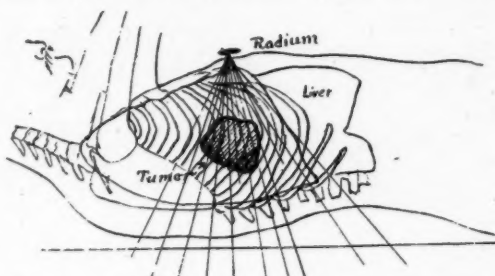


Fig. 2. Illustration of proportionate radium rays reaching the tumor when deep seated.

skin, muscle and fat and as much cancer tissue as possible, could be removed so as to leave only remnants of the growth, the radium or x-ray could be applied directly into the cancer bed with no obstruction to the activity of the rays; in other words, we could transform the deep seated growth into a superficial one. To illustrate this principle, we shall make a schematic drawing which represents a cross section of the body, in the center of which is located a malignant tumor. (Fig. 2.)

Let us suppose that the tumor in this case is about six inches from the surface of the skin. In order that the rays may reach the tumor, they must penetrate and pass through the overlying tissues. These tissues will absorb all the beta, and a portion of the gamma rays. The gamma rays, being very penetrating, will reach the tumor; but that does not mean that all of them will be arrested in the tumor mass. A certain quantity will be arrested in the growth itself and the balance will pass through the tissues beyond the tumor. When a ray is arrested in the cell, it will probably have a more deleterious effect upon the life of the cell. If it passes through the cell, it will no doubt injure it also; but not in the same degree as it would if it were actually arrested in it. We cannot ignore the fact that the tissues above and beyond the tumor must suffer also.

When treating deep seated carcinoma through overlying tissues, we are obliged to use larger

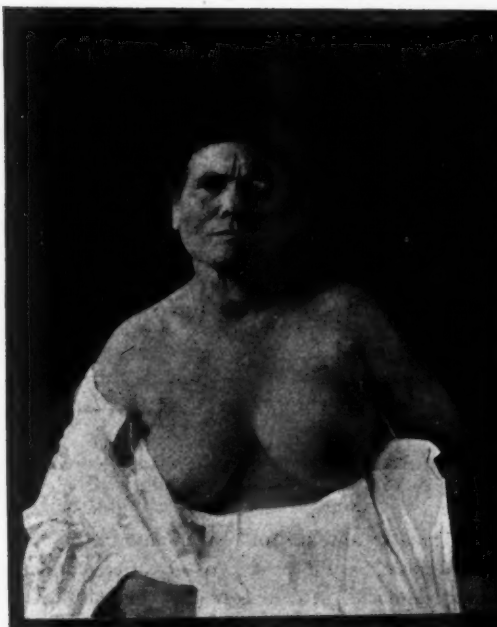


Fig. 3. Carcinoma of the breast involving the axilla.

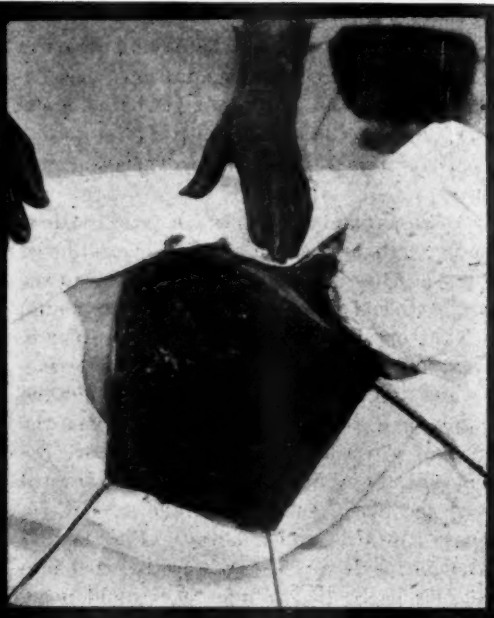


Fig. 4. Amputation of the breast and cleaning of the axilla, for open wound treatment.

doses and more penetrating rays in order to deliver into the tumor the required dosage of rays for its destruction. If, for instance, three inches of fat and muscle intervene between the skin and tumor, it will require three or four times the quantity of the radium properly screened to obtain the dosage such as it would, if the tumor were on the surface. By reducing the dosage, the action of the penetrating rays upon the structures beyond the tumor, will be cut considerably, sparing the normal tissues above and below the growth, consequently preventing a toxemia.

It is thus evident that the application of radium, to be of any value in the treatment of these deep seated or advanced cases of carcinoma must be thoroughly understood. Sufficient knowledge of the physics of radioactive substances as well as the x-ray are essential. This does not mean that an expert physicist will obtain the best results. It requires also a complete knowledge of the pathology and principles of surgery. Those who are familiar with all these three branches: surgery, pathology, and physics have a greater advantage and thus are apt to carry out the treatment more efficiently.

Having thus outlined the principles of application of radium and the shortcomings of its action without surgery, and having suggested a method by which the radium can be applied more directly to the diseased tissues, I shall quote, for illustration, a few of the cases which have been tested with this form of treatment during the past few years.

Case 1. Carcinoma of the Breast. The patient is 54 years old and has a tumor of the breast with retracted nipple, with involvement of the axilla and the supraclavicular space. A typical case of advanced carcinoma of the breast. (Fig. 3).

The operation was performed on Sept. 19, 1920, consisting in a complete resection of the breast and the removal of all the intra-axillary glands in the usual way, except as to the skin closure. (Fig. 4). The wound edges were temporarily approximated by inserting four temporary sutures in order to cover up the region of the vessels in the axilla (Fig. 5). The four sutures were removed 24 hours later and the skin was allowed to retract.

This left a large gapping wound open for radium and x-ray treatment, which was applied subsequently as follows:

9/28/20—1200 mgr. hrs. over dressings screened by lead, rubber and cork.

10/16/20—1200 mgr. hrs. over dressings—screened as before.



Fig. 5. Temporary approximate of skin sutures removed 24 hrs. later.

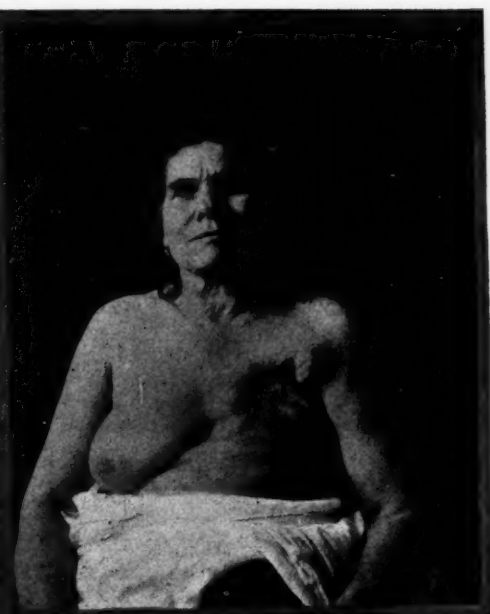


Fig. 6. Pt. five months after the operation with no recurrence.

10/23/20—1100 mgr. hrs. over dressings—screened as before.

11/6/20—900 mgr. hrs. over dressings—screened as before, with the addition of gauze.

This was supplemented by x-ray treatments obtained in standard doses, every third day, for three months.

The skin gradually grew together over the denuded surfaces with the assistance of adhesive strips along the margin of the granulating area until the entire wound was covered.

The patient is now in good health but it is too early to speak of a cure. The case is here represented only to illustrate the technique in the treatment of this kind of case. (Fig. 6.)

Fifteen such cases of recurrent carcinoma of the breast have been treated upon these principles. We feel that it is too early to speak of end results, but what we have gained by our experience will be of great value to us in the future.

Three cases of the fifteen died of radium toxemia. One case died from an erosion of the axillary artery due to an ulcer produced by close proximity of the radium needle on the axillary artery. (Haemorrhage.)

One of the cases died from acute pulmonary tuberculosis after having been free from recurrence for one and one-half years. One case in

which I amputated the entire shoulder girdle, died from perforation of the pleura in the apex region produced by forceps during the dressing. Death followed in a few hours after the accident. The remainder of the cases are still alive but sufficient time has not elapsed to pronounce them cured.

Case 2. Epithelioma of Lower Lip with Involvement of the Glands of the Neck. Patient is 53—presents a large ulcerated growth involving the entire lower lip including the angles of the mouth. He is unable to retain the saliva and has difficulty in eating. The right submaxillary gland is the size of a hen's egg. Patient lost considerable in weight and strength.

Past History: The ulcer first appeared a year ago, in the region of the mucocutaneous border, and gradually grew to the present size. (Fig. 7). It was first diagnosed as syphilis, although the Wassermann was negative. An extensive anti-syphilitic treatment produced no results.

Examination: The growth involves the entire thickness of the lip clear to the gingival margin, and there is no mucous membrane left. The right cheek is involved, a hard nodule 5 inches from the angle of the mouth being present. The left cheek and neck are free. No metastases found in the body.

Treatment: Operation Aug. 13, 1920. Excision of the entire lower lip and both angles of the mouth, and that part of the right cheek containing the nodule



Fig. 7. Epithelioma of the lower lip involving the glands of the neck.

Fig. 8. Introduction of radium into the open wound and beneath the skin.

Fig. 9. Section of upper lip prepared for later plastic.

with a good margin of normal tissue. The incision was then carried to the neck and exposed the region of the gland involvement. The entire area was thoroughly exposed and all glands removed. A suture was made from the angle of the lip to within one inch of the lowest point of neck incision. (Fig. 8). Rubber drain was introduced to leave the channel for radium introduction. No attempt was made to reconstruct the lower lip, at this time. It will be noted that we left the entire surface exposed to facilitate application of radium and bring direct action on same in cancer bed.

Radium treatment was begun a week after operation. A tube of 50 milligrams was inserted for 4 hours into the lower lip wound and 25 milligrams into the channel left in lower border of the wound in the neck. Application of same dosage was repeated

3 times at intervals of 2 weeks. A total of 1400 mgr. hours. The region of the neck was treated weekly with x-ray exposures of 4 minutes and spark gap of 8 inches at intervals of three days.

In Fig. 9 we note the provision which was made for later plastic. A section on each side from the upper lip each about one-half inch long was prepared to cover the defect in the lower. No suturing was done, the two nipple like portions being allowed to drop down towards the raw surface of the lower lip.

In Fig. 10 we demonstrate the application of radium in the recess of the gingiva.

In Fig. 11 a complete healing has taken place. The border of the mucous membrane from the gingiva has joined the border of the skin of the wound edges of the chin. The patient is able to open his mouth widely.

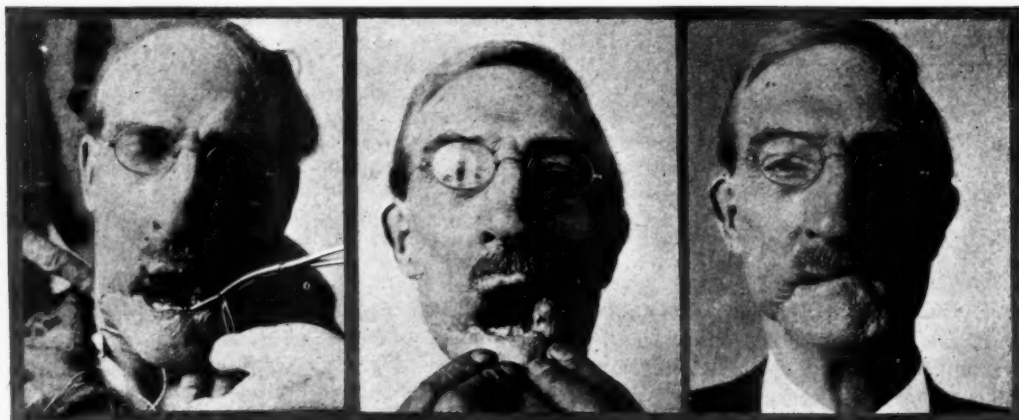


Fig. 10. Cross fire application of radium.

Fig. 11. Complete healing three months after operation, without a plastic operation.

Fig. 12. Illustrating the patency of the mouth.

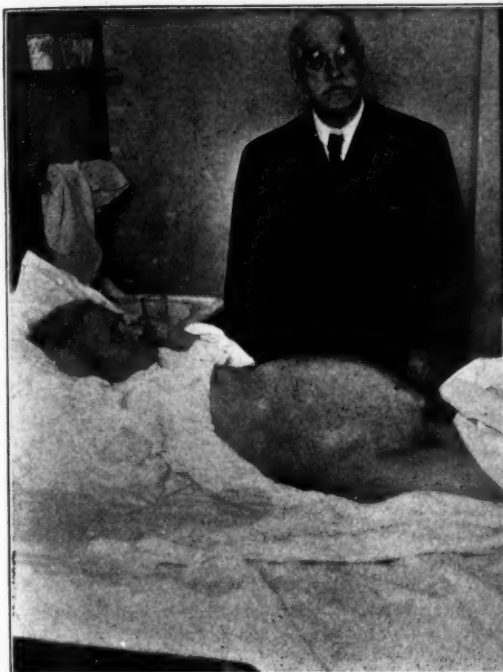


Fig. 13. Malignant ovarian cyst.

In Fig. 12 we show that patient is able to close his mouth patently, he retains his saliva—no difficulty in eating, and up to date there has been no signs of a recurrence.

Case 3. Malignant Ovarian Cyst (Cyst-adenoma) Treated by Open Method. Mrs. E. S. 66 years old entered the hospital March 10, 1919. Since Dec. 1918, she noticed that her abdomen had grown to a very large size. She lost control of her bladder and lost considerably in weight. Her legs were swollen up to her knees. The diagnosis had already been made by her physician as a malignant ovarian cyst.

An exploration was made, the diagnosis was confirmed and the case was considered inoperable. There was some fluid in the abdomen and intestines, and the enormous tumor was matted with intestines and studded with small growths resembling papillomata.

The abdomen was closed. She received x-ray treatment for six months, which did not benefit her. The abdomen grew larger and larger until she could hardly breathe. (Fig. 13).

In her desperation she insisted upon an operation and the same was performed November 15, 1919. Median incision from the ensiform cartilage to the pubes to deliver the tumor out of the abdomen. The loops of the intestines were firmly adherent to the base of the tumor. The tumor itself was firmly attached in the entire pelvis and thus was not removable in its entirety. The cyst was, therefore, opened and its



Fig. 14. Application of radium through funnel shaped crater into the interior of the cyst cavity subsequent to operation.

contents, a gelatinous mass, removed (above five quarts in quantity).

The upper two-thirds of the tumor was then amputated. The wall of the tumor being 2 to 3 inches thick in certain portions and again thinner in other parts. The edges of the skin were then sutured to the rim of the amputated cysts and the cavity packed with gauze so that there was a funnel shaped cavity reaching the lowest part of the pelvis.

The interior of the cyst was then treated by direct application of radium at intervals of three weeks—700 to 1000 mgr. hours being given each time. The radium treatments were supplemented with deep therapy, one erythema dose given every second day.

The cavity gradually diminished in size by contraction of its walls and absorption of the tumor, and the patient gained in general health and strength.

The abdominal opening into the cyst remained open for 16 weeks in a suppurating condition, but finally closed, remaining so up to date—nearly a year and a half after operation. The patient is now attending to her daily housework, and has been able to take care of a very sick husband for nearly four months.

Fig. 14. Shows introduction of radium into the cavity by curved applicator.

COMMENTS

(A) By eversion of the interior of a malign-

nant cyst, we transformed an intra-abdominal, into an external abdominal tumor, and thus are able to apply x-ray and radium directly into the seat of malignancy.

(B) It is safer to treat the tumor in this manner compared to the attempt of complete enucleation.

(C) It is preferable to treat with radium combined with x-ray than either alone.

Case 4. Sarcoma of the Right Lung. Removal of Interior of Tumor—Subsequent Radium Therapy within the Cavity. Previous history: Patient was seen in June 1919. She was referred to me from the Nurses department on account of slight expectora-

again on account of the same symptoms of blood spitting followed by some clots, cough and sputum. The cough had persisted for about three months prior to this, but the weight remained the same. She had had a slight temperature for the past three weeks. Physical examination showed more decided dullness over the right hilus in the back. The x-ray showed that this original shadow was about three times as large. It was round and suggested the textbook description of a hydatid cyst. Thinking that it might be a hydatid cyst, we made careful blood examination. No eosinophilia was ever found. We secured some Weinberg's antigen from New York and a complement fixation with this antigen was negative. Wassermann and complement fixation for tuberculosis were negative.



Fig. 15. Tumor in right lung before operation. (Sarcoma.)



Fig. 16. First step of operation. Exposure of pleura.



Fig. 17. Second operation. Tumor mass excenteration.

tion of blood followed by a slight amount of sputum. She was 23 years of age, unmarried, and her best weight was 126, present weight 124. Three examinations of sputum revealed no tubercle bacilli. Wassermann negative; complement fixation for tuberculosis negative. Afternoon temperature 99.1. Physical examination showed a few moist rales over the right hilus in front and back with no change in the percussion note. There was some slight enlargement of the thyroid. The x-ray stereos showed a well defined, clean-cut hilus shadow in the center of which was another round shaped shadow about the size of a twenty-five cent piece. It was so round in shape and abrupt in its outer margin as to attract attention. It was not typical of tuberculosis or of anything which involved the lung tissue proper. In three weeks the temperature and sputum had disappeared, and the patient resumed her work as a nurse.

On April 7, 1920, the patient was referred to me

In July, 1920, the patient was again referred to us. Physical examination at this time showed feeble breath sounds between the second and fifth ribs with a few fine crepitations. In the back there were also very feeble breath sounds from the third to the seventh rib close to the spine. The tumescence in the lung was about the size of a naval orange. The sputum was negative for tubercle bacilli and for echinococcus hooklets. Neither could pus cells or elastic tissue be demonstrated.

On Sept. 10th, the patient had another attack like the one in April; that is, cough and some hemoptysis followed by bloody sputum for several days and an elevation in temperature. This cleared up in about 3 weeks. During this time the pupils were dilated. The physical signs were more definite over the right lung, and the x-ray showed that the tumescence had increased and was as big as a grapefruit. Present weight 118. At the present writing, the patient has

returned from another such an attack with a decided increase in physical findings, and also in the x-ray which we have indicated in our report.

Examination of the Chest—Right lung: Dullness as low as the sixth rib. Fine rales in the first and second interspaces. The breath sounds, however, are not decidedly interfered with. In the back the breath sounds are weak and inspiration is rough as low as the eighth rib with some crepitations at the base. Left lung: No abnormalities except a few fine rales over the hilus in the back close to the spine.

Interpretation of Stereo Chest Plates—Right lung: There is an enlarged, massive shadow filling most of the lung except the apex and extreme base. This is round in character and reaches the pleura from the third to the seventh rib in mid-axillary line. The

ing slightly in weight; otherwise she was apparently normal.

Stereoroentgenograms revealed a tumor which occupied two-thirds of the right chest cavity; oval in shape and lying transversely within the diameter reaching from the heart to the ribs. (Fig. 15).

A puncture was made with the long trocar and about 10 c. c. of a fluid (almost normal blood), was withdrawn. This did not ascertain the diagnosis and operation was decided upon, and carried out in two stages, as follows:

Primary Operation (under general anesthesia) Oct. 15, 1920. A skinflap including muscles and fat 7 inches in diameter, was raised (Fig. 16). Six inches of each of the fifth, sixth and seventh ribs were resected exposing the pleura over the tumor mass. The



Fig. 18. Showing the depth of the cavity, after removal of tumor.

Fig. 19. Inspection of cavity, showing bronchial opening.

Fig. 20. Skiagram four weeks after the operation.

lung itself seems to be clear. The trachea does not seem to be definitely displaced. Left lung: Clear.

Lateral stereos made from the right to the left with the arm above the shoulder show the lesion adhered to the posterior thoracic wall, and it does not come within six or eight centimeters of the sternum and anterior thoracic wall, the closest point being the area between the third and fifth ribs. In the back, however, it seems adhered as low as the upper part of the eighth rib; in other words, between the fourth and eighth ribs in the back we think the tumescence is touching the pleura.

The third stereos taken left posterior to right anterior shows the upper border of the lesion corresponds with the fifth rib in the back and can be seen as low as the sixth rib in the anterior axillary line.

History: Patient came to me on Sept. 28th, complaining of shortness of breath; coughing mornings; expectorating small quantities of rusty sputum; los-

skinflap was roled up and fastened with sutures, thus leaving the entire square (about 7 inches in diameter) exposed. The exposed pleura was then cauterized with silver nitrate stick in order to produce adhesions between the tumor and the pleura. The open wound was dressed with vaseline gauze.

Second Operation (under gas and ether) Oct. 18, 1920. The wound was exposed and a purse string suture placed in the center of it to insure quick closure in case there should be uncontrollable hemorrhage. The tumor wall was then incised; the capsule was rather firm but the interior of the tumor was composed of a semi-solid brain like tissue, perhaps somewhat more solid but not homogeneous. More solid portions than softer portions. It was possible to evacuate the contents in similar manner of delivering an adherent placenta. (Fig. 17). The mass was not entirely removed although it would have been possible at the risk of more severe hemorrhage, as

we could introduce the entire hand and wrist into the cavity and reach all portions; but we were satisfied to have opened the cavity and eliminated the greater part of the mass without breaking the capsule. The cavity was quickly packed with 12 face gauze sponges. Patient left the operating room in good condition.

After Treatment: Forty-eight hours after the operation the 12 soft gauze sponges were removed under anesthesia. There was no hemorrhage; but we removed another four or five ounces of the tumor mass from certain recesses of the enveloping capsule. The cavity was repacked. (Fig. 18). One week after the operation 50 mgr. of radium was introduced into the cavity in the center of a rubber ball, giving some 375 mgr. hours. The wound was dressed daily (Fig. 19) and the following dosage of radium was introduced on the following dates:

Oct. 28, 1920, 600 mgr. hrs.; Nov. 8, 1920, 425 mgr. hrs.; Nov. 18, 1920, 450 mgr. hrs.; Dec. 6, 1920, 400 mgr. hrs.; Dec. 3, 1920, 400 mgr. hrs.; Dec. 22, 1920, 300 mgr. hrs.; Jan. 14, 1921, 450 mgr. hrs.; Feb. 2, 1921, 400 mgr. hrs.

Stereoroentgenogram taken four weeks after the operation shows only a small remnant of the tumor mass, and the tumor wall is very thin. (Fig. 20). Patient is able to walk and is rapidly gaining in weight and strength.

Patient is now back at her former residence and although she has not resumed her former duties as a nurse she is still gaining in weight and strength.

COMMENTS

The cases that are here cited were selected for the purpose of illustration of the principles of the technique in the progress, and not for statistics. A statistical report with more definite conclusions will be postponed and be given in about two years. At this time we can only state that we are not discouraged. In every case there was an actual gain because with the exception of three, everyone submitted to the treatment was considered hopeless from the start.

Our mortality naturally was very high on account of the extensive operations which had to be undertaken, and also on account of the mishaps which might be avoided in the future. Four of our cases died from acute hemorrhage due to ulceration of the large bloodvessels; one from the femoral, one from the axillary, and two from the carotid. Four cases died from the roentgen ray toxemia.

On the other hand we have a number of cases which have stood a reasonable test of time. A case of carcinoma of the breast is still alive without recurrence two years after the operation. One case of carcinoma of the submaxillary gland in which three radical operations preceded

the last (which was the open method), has no recurrence for two and one-half years and is in perfect health, and others which, according to past experience and general rules, should have terminated fatally before this, are still alive and without recurrence; but not sufficiently long to count them as cures. At any rate we are satisfied that we have done harm to none and benefited a few.

DISCUSSION

DR. H. H. BOWING, Rochester: I am greatly interested in this report and clinic Dr. Beck has given us. I regret that time did not permit a more complete exposition.

I am not qualified to discuss this paper, for Dr. Beck is doing a pioneer work, a distinctive type of surgical procedure in combating advanced malignancy and time will tell whether or not he will continue to subject his patients to such heroic surgery.

It may be indicated in some cases. I am convinced that wide excision in combating borderline or advanced carcinoma of the cervix uteri is contraindicated; it does not facilitate irradiation.

The patients as a group are best treated with intensive irradiation, that is, radium or radium and x-ray, and in an occasional case surgery is indicated to make irradiation more effective.

It is my privilege to treat many similar cases, although I do not recall a case of primary sarcoma of the mediastinum. Sarcoma of the abdominal lymphatics with the primary in a testicle does not respond to radium and x-ray, the initial result following intensive irradiation is glittering.

Inoperable carcinoma of the thyroid yields very readily to intensive irradiation. 1000 milligram hours of radium is delivered to each square inch of skin surface overlying the tumor. 50 milligrams in a tube applicator are used, screened with one-half a millimeter of silver and two millimeters of lead at one inch distance. Time: 20 hours for each square inch. The treatment may be repeated in 30 days.

Carcinoma of the breast, either primary or recurring following radical amputation, respond to radium and x-ray therapy. The radium is screened and timed as mentioned in the cases of carcinoma of the thyroid. Each involved square inch of skin surface is treated. Shadowgraphs of the chest are taken to locate possible deep lymphatic involvement. All possible metastatic areas are exposed to intensive x-ray treatment. In advanced cases improvement is noted in most all, as a rule local sloughing is prevented and the deep metastasis are favorably influenced.

I recall one case of inoperable carcinoma of the ovaries in a young adult. An exploratory operation was done; a great portion of the tumor was removed and drainage tubes put in place and the abdomen closed. Fifty milligrams of radium in a round tube applicator was placed in each drainage tube, filtered with one-half a millimeter of silver and allowed to

remain in place for ten hours. Radium was placed into the vagina screened with .5 millimeters of silver, one millimeter of brass, one centimeter of gauze, and a finger cot. This package was placed in the right and left vaginal fornix and left in each place for 14 hours. Two or three applications were made and deep x-ray therapy was given over the lower abdomen and back.

Three months following this application, the patient returned for observation. At this time remaining tumors were rapidly diminishing in size. Nine months following the irradiation, no demonstrable pathology could be palpated.

Retroperitoneal sarcoma has responded well to combined radium and x-ray therapy. One case in mind of a man aged 23 years in which a right castration was done nine months previous and a diagnosis of sarcoma was made. When the patient presented himself for examination, the whole abdomen with the exception of the lower right quadrant was filled with a huge mass. Radium was given to the anterior abdominal wall and deep x-ray therapy was applied to the posterior and lateral walls.

1000 milligram hours of radium was delivered to each square inch of skin surface over the involved anterior abdomen, screened and applied as mentioned in cases with carcinoma of the thyroid. The boy reported six months after the first application and no demonstrable pathology could be palpated.

It has not been my privilege to treat primary sarcoma in the thoracic cavity. The primary foci and position of the sarcoma controls the response to radium and the ultimate prognosis. Time will not permit further citation.

It is absolutely essential that the radium be properly applied and maintained in order to give the desired results. Patients with a malignant condition in such an advanced age as reported today will submit to most any type of procedure, although I am of the opinion that we must be conservative since we have effective therapeutic agents, radium and x-ray.

I appreciate listening to Dr. Beck's paper and I sincerely hope he will keep us posted as to the ultimate outcome of his cases.

DR. A. S. FLEMING, Minneapolis: Dr. Beck's paper seems to me to demonstrate conclusively the wonderful adjunct the surgeon has in radium in making his fight against malignancy. The surprisingly excellent results obtained in what appear to be absolutely irreparable cases are leading radiologists and surgeons to apply radium more and more frequently, and as the technique of its application is becoming more thoroughly worked out and uniform radiation of the malignant tissue being secured, the fight against malignancy is apparently gaining ground.

There is only one point that I want to emphasize in connection with this paper, and I think all of you will agree with me, and that is, the profession needs to entertain a more optimistic attitude with reference to malignancy. The laity only reflect the opinion of

the profession. The profession is very pessimistic. We are inclined to blame the laity for being pessimistic, but it is in no sense their shortcomings, but it is the attitude of the shortcomings of our profession.

The thoroughness of surgical measures adopted here, facilitating the more thorough radiation, is in a measure responsible for the results secured. The embedding of radium in the tissues is aiding a great deal to our securing more favorable results. The question of the physical and chemical problems involved in the application of radium is too complicated to enter into at this time. It seems to me, the more we are making available the beta rays, and the less dependence we place upon the gamma rays, the greater our success in its application will be.

DR. BECK (closing the discussion): I have very little to add to what has been said by those who have discussed my paper, but a few additional words might interest you. I have some views in regard to the question of why the cancer cell will succumb to the x-ray quicker than a normal cell, and if you will bear with me for two or three minutes I will be glad to give you those views.

A mass of cancer cells may be likened to an alienated detached and lawless community, the members of which have no function than reproduction and self nutriment. They know how to appropriate for themselves plenty of nourishment at the expense of the whole body. These cells grow without any definite arrangement of structure or function, in a lawless manner, and do not give any counter service to the organism in return for the nutriment they receive.

The growth is not under the control of the central nervous system. This community of cancer cells may justly be likened to some insurgent group of revolting men whom we often find in peaceful communities, who do not wish to perform any labor and ask for everything that labor produces. They too are also able to appropriate plenty of nutriment for themselves in a lawless manner—a sort of a Bolshevik community.

Is it not likely that these recalcitrant cells (cancer cells) which render no service to the whole, are denied the same protection against all sorts of injuries, which the normal working cell of the body receives? The normal cell belongs to the organism, and is under the control and protection of the cell community. It may be that some enzyme or lack of some substances of the normal cell, or some faulty arrangement of the chromosome weakens the resistance of the cancer cell.

Cancer has no nervous system. The skin, with all its sensitive nerve fibres, protects us from burns. That is not the case in cancer. A finer definition might be given, but I am of the opinion that the cancer cell is an outlaw cell which has no protection from the general organism.

In regard to the cases I have shown, I have more cases that are alive after three and a half years. One patient who had three radical operations on the neck

is still alive and well. Other cases are alive one or two years after treatment, but it is still too early to predict what the ultimate results will be. A large number of cases have been operated on too recently to make any predictions.

A REPORT ON FIFTY CONSECUTIVE CATARACT OPERATIONS BY THE SMITH-INDIAN-FISHER METHOD*

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The word cataract is an ancient one. The names and synonyms of many of the varieties of cataract appeared at an early date in Greek, Arabic and in Latin, after which they were either adopted in their original form by British authors or were translated, more or less literally, into English. A percentage of these early terms were based upon, or derived from, erroneous theories of the origin and other relations of true cataract. In fact, until the beginning of the eighteenth century all opacities (apparent or real) of the optic media were included under the term "cataract."

Beard gives a most useful, modern and scientific classification, as to age, cause, etc., as follows:

1. According to the age at which it appears: congenital, juvenile, adult, senile.
2. According to the cause: spontaneous, traumatic, symptomatic, albuminuric, arterio-sclerotic, chemic, thermic, heat, cold, electric, diabetic, glaucomatous, malarial, phosphaturic, naphthalmic, spasmodic, ergotinic, ciliary cramp, tetanic, thyroidismic, uveitic.
3. According to consistency: liquid, soft, semi-hard, hard, ossific, calcific.
4. According to color: white, gray, greenish, amber, black, blue.
5. According to extent: total, partial, nuclear, perinuclear, cortical, capsular.
6. According to the seat and disposition of the opacities: central, nuclear, perinuclear, anterior, cortical, posterior cortical, anterior polar, equatorial, disseminated, punctate, zonular.

7. According to the presence or absence of complications: simple, complicated.

8. According to the period of development: incipient or commencing, immature, mature, hyper-mature or regressive.

Cataracts are generally considered to be a senile degeneration. Almost all pathologic changes that effect the nutrition of the eyeball may produce it. In that sense it is generally a secondary disease, and we know that nephritic alterations, diabetes, exposure to great heat, various poisons, arterio-sclerosis, ergotism, auto-intoxication, eye-strain, injury to the lens or surrounding parts, heredity, etc., are regarded as exciting causes of it.

There are no constant symptoms of cataract in general, especially in the early stages. Sight will not be much affected until the nucleus is involved. The patient then complains that images are distorted or multiplied or that there is a cloud, or floating body, before the eyes.

The foginess increases very slowly until finally the visual acuity is reduced to the counting of fingers. In the early stages, before the opacity has completely invaded the periphery, vision is better in a dim light, because that moderate dilation of the pupil that occurs in a partially illuminated room, for example, permits the patient to see through some, as yet unaffected, peripheral parts of his lens.

Herbert whose immense experience gives him a right to speak upon this subject, believes that it is most convenient from the clinical standpoint to divide the stages of development of cataract into: (1) incipient, (2) unripe, (3) ripe, or mature, and (4) over-ripe. It may be roughly stated that in the incipient stage they often require a dilated pupil or dark room examination for their certain detection. Unripe cataracts are at once recognizable with the naked eye, but there is still some transparent or semi-transparent cortical matter remaining. In the ripe stage the whole lens is opaque. Over-ripeness is shown by certain secondary changes, and by the formation of capsular opacities, recognizable by being whiter than any superficial opacity of lens substance. The term "ripeness", indicating complete opacity of the lens, implies also that the whole lens can be removed from the capsule easily, "like a ripe fruit out of its shell". The term is still retained to denote the fullness of

*Read before the Minnesota State Medical Meeting, St. Paul, October, 1920.

the cataractous change, though it has long been recognized that lenses are fit for removal while still preserving much of their transparency.

The cataract was unrecognized as a disease of the lens until 1650 A. D. Previous to that time it was supposed to be an effusion between the lens and the cornea.

The non-operative treatment of cataract has occupied the attention of ophthalmologists from the earliest times, both before and since its pathology was understood and a precise knowledge of the difference existing in its varieties has been acquired. In some cases of genuine cataract, the opacity has disappeared without treatment, and there can be no doubt but that diabetic striae not uncommonly disappear or the occasional cloudiness of the lens due to exudates between the fibrillae may undergo absorption; but apart from these considerations the application of drugs produces little or no effect.

Jacques Daviel in 1748 first published a description of the modern operation for senile cataract. The cut was made with the flap down, by the use of a keratome and then enlarged by the scissors. The capsule was incised with a needle. Later the German operators made the flap up, which is our present method.

The extraction with an iridectomy was introduced by Von Graefe in 1866. The extraction in the capsule was suggested by Beer, but was performed and the technique explained by Lieut. Col. Henry Smith of India.

We visited some of the Indian operators in this country and finally decided on the Fisher method as being the safest: first, because of his lid hooks which give complete control of the lids and prevents the patient from squeezing the eye, and second, because of his needle, which is the safety valve of the whole operation.

With this method it is not necessary to wait for the cataract to get "ripe". Whenever the patient is unable to see well enough to get around, the cataract is ready for operation.

The success of the operation and the after results depends on several factors: first, the preparation of the patient; second, the patient on the operating table; third, the operator and his assistant; fourth, the complications during the operation; fifth, the behavior of the patient after the operation; sixth, the after inflamma-

tion; seventh, the clearness of the pupil; eighth, the condition of the vitreous and fundus.

Under the first, we consider the general physical condition of the patient; the blood pressure, urine, tension of the eye, the condition of the conjunctiva as to bacteria, the lacrymal sac, and, what is probably the most important, the teeth, nose and tonsils.

Second, we always give our patients a hypodermic of No. 1 H. M. C. before coming to the operating table. This gives you a quiet patient at the time of the operation and eliminates many troubles.

Third, the operator must be fairly skillful and have a knowledge of what to do when complications arise; and he must have a good assistant.

Fourth, under complications during the operation, we mean loss of vitreous, ruptured capsule and spontaneous hemorrhage, as these have a bearing on the amount of vision the patient gets.

Fifth, some patients behave badly after the operation, opening and closing the eye endeavoring to see. Occasionally a patient vomits and occasionally one goes insane, but the most damage comes from the one who keeps poking at the bandages and in doing so, strikes the eye, opens the wound and gets a prolapsed vitreous or iris. Another class starts doing heavy work too soon after the operation.

Sixth, we have found that when a piece of capsule or cortex was left behind or if all focal infections were not removed before the operation, when the bandage was removed, we invariably found a red eye. So far, we have had no infections but this will happen occasionally to the best operators.

Seventh, if the cornea is clear and no capsule left, other things being equal we will have good vision. If the capsule is left, the vision is reduced in spite of needling operations.

Eighth, cataract eyes are, in many cases, diseased. While you are unable to tell beforehand, you are often disappointed to find after a successful operation that the patient has changes in his vitreous or fundus, and in some cases after a perfect operation, a clear pupil, and so far as you can discern, a normal vitreous and fundus, still this patient cannot see well.

Briefly, the technique of this operation is as follows. A hypodermic of H. M. C. is given after the cocaine anesthesia, the conjunctiva sac is

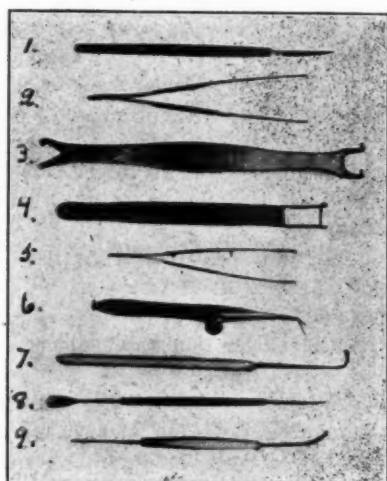


Fig. 1.

flushed with 1-5000 bichloride. The cut is made with one sweep of the knife and in the cornea. An iridectomy is performed. With the large Indian hook in one hand and the Fisher needle in the other, the pressure is begun on the lower part of the cornea with the Indian hook and the lens followed up until delivered. If the vitreous presents and the eye is in danger, the needle is thrust into the lens, the capsule ruptured, the lens delivered and the capsule falls back in the eye. You are then in about the same condition you would be if you had performed the old classical operation. The iris is then replaced and the eye closed.

The hard part of the operation is the pressure; it must be of the right amount, steady, and let up at the right time. The lens is delivered under the upper lid and as it is not necessary for the patient to keep looking down; this eliminates the greatest danger of loss of vitreous. After the iridectomy you need not again speak to the patient until the operation is completed and then only to tell him to close his eyes. A thin eye pad is put over both eyes and fastened



Fig. 2.

with adhesive, a starch bandage is applied and the patient told to remain quiet until the bandage is dry.

He is left in bed three days and then allowed to sit up. On the fifth day the starch bandage is removed and he is given the use of the unoperated eye, and on the ninth day, the operated eye is opened and as a rule he goes home two or three days later. During this time he has had absolutely no pain. In about six weeks he returns for refraction.

We present to you these cases with their results. Altogether, we consider the method far superior to the old classical one for the following reasons:

First, the cut is made with one sweep of the knife and so does away with the saw tooth edges of the wound, which causes slow healing.

Second, the short stay in the hospital.

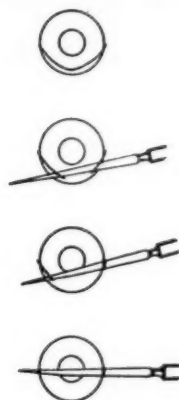


Fig. 3.

Third, no after pains and the complete comfort of the patient except for the blindfold.

Fourth, very little or no iritis.

Fifth, clear pupil and no secondary operation needed.

Sixth, better vision.

SUMMARY

We used the Fisher needle in six cases. In three of these cases it was necessary to needle the capsule with a visual result of 20/30, 20/50, 20/60. In the others, the visual results were 20/20, 20/40, 20/50.

The capsule ruptured in delivery in three cases with a vision of 20/30 in one while the other two were not refracted.

There was iris prolapse in four cases with vision of 20/15, 20/30, 20/50, 20/50.

Vitreous loss in seven cases.

No. 20. Put fingers under bandage on fifth day; vision 20/40.

No. 39. Vomited the second day; vision 20/30.

No. 42. Looked down and out when bandage was being placed; said he was trying to see; vision 20/80.

No. 43. Same-cause as No. 42; vision 20/100.

No. 47. Iris attached to lens, making very

No. 13. Choroiditis and corneal scars, vision 20/70.

No. 27. Vision was always poor, fundus appears normal, vision 20/200.

No. 32. Vision always poor, eye turned out. Blood clot organized, needled, followed by glaucoma, vision 20/150.

No. 34. Choroiditis, chronic, vision 3/200.

This leaves forty-one cases of completed Smith-Indian-Fisher operations for consideration of the resultant vision.

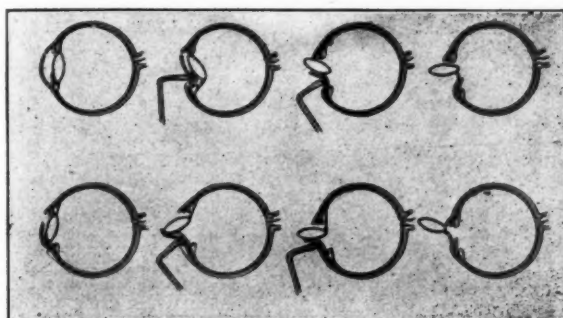


Fig 4.

sudden delivery; vitreous semi-fluid; vision 20/30.

No. 48. Needle was used and vitreous escaped while removing capsule with forceps; vision 20/20.

No. 49. Vitreous loss at operation, following delivery, vision 20/30.

One case had a fluid vitreous in both eyes. The lenses were removed with a loop. The first lens was delivered with capsule; vision 20/20. The second capsule ruptured and was not refracted.

Five cases were not refracted and four following cases were known to be poor eyes to begin with, namely:

50 CASES

| | |
|----------|---------------|
| 10 cases | 20/20 |
| 15 " | 20/30 |
| 6 " | 20/40 |
| 6 " | 20/50 |
| 2 " | 20/60 |
| 1 " | 20/70 |
| 1 " | 20/80 |
| 1 " | 20/100 |
| 1 " | 20/150 |
| 1 " | 20/200 |
| 1 " | 3/200 |
| 5 " | Not refracted |

41 CASES

| | |
|---------|---------------|
| 9 cases | 20/20 |
| 13 " | 20/30 |
| 5 " | 20/40 |
| 4 " | 20/50 |
| 1 " | 20/60 |
| 1 " | 20/70 |
| 1 " | 20/80 |
| 1 " | 20/100 |
| 1 " | 20/150 |
| 1 " | 20/200 |
| 1 " | 3/200 |
| 3 " | Not refracted |

REPORT ON FIFTY CONSECUTIVE CATARACT OPERATIONS

| | Name | Age | Eye | Used Needle | Vit. Loss | Prol. Iris | Rup. Cap | Hosp. Days | Lenses | Vision | |
|----|--------|-----|-----|----------------|--------------|---------------|-------------|---------------|-----------------|--------|---|
| 1 | Mrs. P | 74 | L | | | | | 14 | +10.00 | 20/30 | |
| 2 | Mrs. A | 84 | R | | | | | 14 | +11.00+2.00x180 | 20/20 | |
| 3 | Mr. S | 71 | R | Yes | | | | 14 | +11.00 | 20/60 | 7th Month Capsule needed |
| 4 | Mr. S | 71 | L | | | | | 14 | +11.00+1.25x10 | 20/20 | |
| 5 | Mr. D | 57 | R | | | | | 14 | +10.00+2.00x30 | 20/20 | |
| 6 | Mr. D | 84 | R | | | | | 21 | + 9.00+3.00x180 | 20/50 | |
| 7 | Mrs. C | 48 | R | | | Yes | | 30 | +10.00+4.00x105 | 20/30 | |
| 8 | Mr. H | 70 | R | | | | | 14 | +13.00+3.50x60 | 20/20 | |
| 9 | Mr. L | 77 | R | | | | | 14 | +11.00+1.00x180 | 20/30 | |
| 10 | Miss G | 70 | L | | | | | 14 | + 9.00+2.00x30 | 20/30 | |
| 11 | Miss B | 70 | R | | | | | 14 | +12.00+1.00x15 | 20/40 | |
| 12 | Mr. W | 72 | R | | | | | 14 | + 9.00+4.00x20 | 20/30 | 18th Month Suddenly blind Fundus appears normal. |
| 13 | Mr. E | 58 | L | | | | | 14 | +11.00+4.00x60 | 20/70 | Chorioiditis Corneal scars. |
| 14 | Mrs. G | 78 | R | | | | | 14 | +12.00+2.50x180 | 20/30 | |
| 15 | Mr. P | 72 | L | Yes | | | | 14 | +12.00 | 20/50 | 3rd Month Capsule needed. |
| 16 | Mrs. H | 64 | R | | | Yes | | 30 | +10.00+2.00x90 | 20/50 | Prolapsed iris. Both angles. |
| 17 | Mrs. P | 79 | R | | | | | 21 | | | Cataract Mania. Never refracted. |
| 18 | Mrs. S | 68 | R | | | | | 14 | +10.00+3.50x20 | 20/20 | Blood pressure 180. |
| 19 | Mrs. T | 60 | R | | | | | 14 | +13.00+1.00x180 | 20/30 | Blood pressure 170. Very nervous. |
| 20 | Mr. P | 72 | R | | Yes | | | 14 | +10.00 | 20/40 | Finger under bandage. Prolapsed vitreous. |
| 21 | Mr. S | 76 | L | | | | | 21 | +11.00+ .50x45 | 20/30 | |
| 22 | Mr. S | 65 | R | | | | | 14 | +11.00+1.00x180 | 20/40 | |
| 23 | Mr. F | 52 | L | | Fluid | | | 10 | + 8.00+2.00x180 | 20/40 | Lens removed with loop. |
| 25 | Mrs. R | 62 | L | | | | | 10 | + 9.00+3.00x180 | 20/20 | |
| 26 | Mr. F | 67 | L | | | | | 7 | +13.00 | 20/20 | |
| 26 | Mr. F | 67 | L | | | | | 7 | +13.00 | 20/20 | |
| 27 | Mr. F | 67 | R | | | | | 9 | +13.00 | 20/20 | Vision always poor. Fundus appears normal. |
| 28 | Miss P | 63 | R | | | | | 12 | +12.00 | 20/50 | |
| 29 | Mr. P | 63 | L | | | | | 12 | +12.00 | 20/20 | |
| 30 | Dr. P | 59 | L | | | Yes | | 10 | +13.00+3.50x150 | 20/15 | |
| 31 | Mrs. K | 73 | R | Yes | | | | 9 | +11.50 | 20/40 | |
| 32 | Mrs. G | 57 | R | | | | | 9 | +12.00+2.50x90 | 20/150 | Vision always poor. Organ- ized clot ant. cham. Needed. Glaucoma. |
| 33 | Mr. H | 56 | L | Yes | | | | 10 | +11.00+2.50x90 | 20/30 | 2nd Month. Capsule needed. |
| 34 | Mr. R | 67 | R | | | | | 7 | + 9.00+4.00x165 | 3/200 | Chorioiditis. |

| | Name | Age | Eye | Used Needle | Vit. Loss | Prol. Iris | Rup. Cap | Hosp. Days | Lenses | Vision | |
|----|--------|-----|-----|----------------|--------------|---------------|-------------|---------------|-----------------|--------|---|
| 35 | Mrs. C | 70 | R | | | | | 10 | +14.00+1.00x75 | 20/30 | |
| 36 | Mr. W | 65 | L | | | | | 14 | +10.00+2.00x5 | 20/30 | |
| 37 | Mr. F | 75 | L | | | | Yes | 33 | | | 1st Month Hemorrhage from over work. Glaucoma. Vision lost. |
| 38 | Mr. F | 52 | R | | Fluid | | Yes | 10 | | | Lens removed with loop. |
| 39 | Mrs. S | 72 | R | | | | | 14 | + 8.00+2.00x30 | 20/30 | 2nd day vomited. Prolapsed vitreous. |
| 40 | Mr. G | 56 | R | | | | Yes | 14 | +10.00+4.50x80 | 20/30 | |
| 41 | Mr. S | 66 | L | | | Yes | | 14 | + 9.00+3.00x45 | 20/50 | Iris prolapsed. Cut off. |
| 42 | Mr. B | 78 | R | | Yes | | | 37 | +11.00+1.00x90 | 20/100 | After operation looked down. Loss of vitreous. |
| 43 | Mr. O | 60 | R | | Yes | | | 21 | +12.00+1.00x90 | 20/80 | After operation looked down. Loss of vitreous. |
| 44 | Mrs. P | 63 | L | | | | | 10 | | | |
| 45 | Mrs. H | 81 | R | | | | | 12 | + 8.00+4.00x15 | 20/60 | Projection poor. |
| 46 | Mr. C | 68 | L | | | | | 13 | +10.00+ .75x180 | 20/40 | |
| 47 | Mr. K | 65 | L | | Yes | | | 13 | +13.00+1.50x60 | 20/30 | Iris attached to lens. Vitreous semi-fluid. |
| 48 | Mrs. W | 59 | R | Yes | Yes | | | 21 | + 8.50+ .75x15 | 20/20 | Capsule removed with for- ceps. Vitreous loss. |
| 49 | Mrs. P | 60 | R | | Yes | | | 14 | +11.00 | 20/30 | |
| 50 | Mr. F | 62 | R | Yes | | | | 14 | +11.00+2.00x25 | 20/50 | |

DISCUSSION

DR. F. E. BURCH, St. Paul: There are a good many things I would like to say about the Smith-Indian operation, but I will not do so on account of lack of time. There can be no doubt about certain advantages in the modified Smith operation that are obtained by freedom from trouble with the capsule afterwards and general post-operative interference of any kind. This operation has been discussed so much that almost everyone here knows pretty well how most men feel about the Smith-Indian operation. I think that for every oculist the method of cataract extraction becomes in the end purely a personal equation. It means following a technic which, for his patient, is best adapted to each surgeon and the kind of training the operator has had.

For Dr. Pratt, I am sure this method is the method of choice for him and for his patient. He has acquired a technic and he knows how to apply just the right amount of pressure on the cornea. He feels that the best results are obtained by this method.

There has always been a difference of opinion about this operation among the oculists who do not do it. The reasons are based primarily upon a fear of a loss of vitreous. Personally, I believe that the fear

of loss of vitreous is well proven. A good many experienced operators have undertaken to do the original Smith operation and many of them have frankly reported loss of vitreous during extraction which exceeded by far that which occurred by the ordinary methods. Herbert, in his book on cataract, reported some operators had obtained as high as 33 per cent loss of vitreous. Loss of vitreous is really harmful. Many of these patient lose a little vitreous which does no harm at the time, but even though they have good vision for a year or so, in the end vision is not as good as where no vitreous is lost. I cannot escape from the thought that extraction of the lens and leaving the capsule is the better method, because after the lens is removed I believe the capsule still affords valuable support for the vitreous.

It seems best that each operator follow the technic which is most satisfactory for his own use, after he has acquired a certain experience and training in the technic which suits him. I am sure the results in Dr. Pratt's series of cases are as good as any I have seen. They are unusually good, better than most of us obtain by the old standardized method.

DR. WILLIAM BENEDICT, Rochester: In going

over this report of Dr. Pratt's I was struck by the frequency with which he was able to remove the lens with the capsule in its entirety. If we leave out those cases in which he found it necessary for some reason or other to needle the lens or those in which the lens capsule ruptured, we still have 82 per cent of total extractions.

I think the reason the Smith operation is not followed by more operators is because Smith discouraged its use among those who could not quickly learn its technic and among those who were doing less than 100 cataracts a year. He thought it necessary to do a large number of operations to keep one's hands well trained.

The advantages of the intracapsular extraction where it can be successfully done are certainly manifest. The iritis that occurs following the capsulotomy operation is the greatest bugbear with which the operators have to contend. We are already convinced that the greatest part of the cyclitic reaction is due to contact of the cortical portion of the lens with the iris. That can be avoided by the Jackson operation, in which he splits the upper part of the equator of the lens, spilling none of the lens substance, or completely removing the cortical substance by use of an irrigator.

DR. C. N. SPRATT, Minneapolis: The essayist in his remarks has given one view of the intra-capsular operation and when so presented to this society it is proper that attention should be called to some of the objections to the method.

In the first place this operation is not the one of choice of the majority of the leading American and European operators. But it has been exploited by a comparatively few men, many of whom have nothing more than a local reputation.

Sharp, a British surgeon in 1753 gave a clear description of the operation of extraction in capsule. Since then at various times other operators have revived or modified the method in the attempt to achieve the ideal. The Pagenstecher brothers, whose names deserve to be associated with the operation as much as any others, wrote in 1866 as follows:

"The extraction of the crystalline lens within its capsule removes all predisposition to an inflammatory process on the part of the iris. In the 200 cases on which we have operated, we have not observed a single primary iritis. This operation excludes all secondary operations. The acuteness of vision is greater after this operation than after any other. Twelve times out of a hundred the acuteness becomes normal. While it presents all these advantages this operation does not entail more total losses of eyesight than ordinary extraction. The defects of this operation consist in the difficulty of operative technic and in reaching an exact diagnosis in certain cases. Granting that the freedom from iritis and the advantage in following the operation with a secondary does the intra-capsular operation offer as large a

percentage of useful eyes as does the classical, simple or combined operation".

Our essayist mentions the point of the short stay in the hospital. Time is not the most important thing that is to be considered. The ordinary patient that goes to the hospital for a cataract operation can just as well stay fourteen days as twelve. After the combined operation my patients stay on an average of from eight to nine days in the hospital.

There is no question that iritis is less common after the intra-capsular operation than after the combined.

One of the most serious drawbacks of the intra-capsular operation is the loss of vitreous. I am one of those who believe that loss of vitreous is a complication and should be avoided if possible as it is generally held that the vitreous does not regenerate. In my last fifty cases done by the simple or combined method 4 (8 per cent) have suffered a loss of vitreous. Major Smith, a most expert operator, has a loss of 6 or 8 per cent with the intra-capsular, other operators report from 14 to 25 per cent. Of my four cases in which this accident occurred, one developed iridocyclitis with loss of the eye, a second patient had 5/9 vision two months after operation but some six months later total loss with irido cyclitis. The third patient had 5/12 and the fourth patient had 5/5.

As to the comparative visual results of the two operations so much depends on the accuracy of the refraction, the type of cataract operated upon and the honesty of the individual reporting the case.

In my 50 cases I have not included any eyes that had complications. As stated before two eyes were lost and one patient, a man age 88, never returned for glasses so that the vision could not be recorded.

Of these 47 patients fitted to glasses, 37 (74%) had normal vision or better and over one-half of these had 5/4 or better, of the remaining 10, 6 patients (12%) had 5/9 or better, 3 patients (6%) had 5/12 and 1 patient 5/50.

Secondary operations were necessary in 13 patients (26%).

DR. F. J. PRATT, Minneapolis, (closing): I can make no comparisons with the classical method except with this one by Harrison Butler in the British Journal of Ophthalmology, July, 1919. He says: "I needle 22 per cent of my cases. Most surgeons needle more frequently. I ascribe my low figure to three circumstances. One is that I generally perform a preliminary iridectomy; another that I rarely operate until the cataract is mature; and last that if the patient is perfectly satisfied with 6/12 (20/40), I do not needle to get better acuity. I lost two eyes after discussion so I never tempt Providence if I can avoid it."

I would never attempt a real Smith-Indian operation because, if vitreous presents, there is nothing to do but keep on pressing. The reason we follow Fisher is because of his needle which you use if

vitreous presents, making the operation safe. So far our experiences show that we would rather lose a little vitreous and remove the capsule than we would to leave the capsule. Our results have shown that we have less trouble with the patients after operation and better vision.

THE RELATION OF HEPATITIS TO CHOLECYSTITIS*†

WM. CARPENTER MACCARTY, M. D.

ARNOLD JACKSON, M. D.

Rochester, Minn.

In 1910 one of us (MacCarty) emphasized the close anatomical, physiological, and pathological relationship of diseased conditions of the stomach, duodenum, gall-bladder, liver and pancreas and at that time the gastro-duodeno-hepaticopancreatic physiological system was described. An endeavor was made to arouse investigators, especially clinicians and surgeons, to the importance of this group of organs from the standpoint of clinical and surgical diagnosis and treatment and also to show that disease in one of these organs is frequently if not always associated with changes in one or more of the others. In another article was pointed out that there is apparently a sequence of events in the development of pathologic conditions in this group of organs. This sequence begins apparently with appendicitis—possibly antedated by typhlitis—and passes through pylorospasm, duodenitis, duodenitis ulcerosa, cholecystitis and hepatitis, cholelithiasis, pancreatitis, gastric ulcer, and gastric carcinoma. It was not suggested that a given patient would necessarily have all of these conditions in sequence but that anyone having one usually had some signs of having had one or

more of those preceding their condition in the sequence.

As a result of the pathological and clinical facts, which led to this conception of possible pathologic relationship and sequence, continued observations have been made. As a part of this investigation a large number of livers associated with cholecystitis have been studied during surgical operations. While the series of specimens herewith reported includes only fifty-eight cases, it represents but a part of about one hundred and fifty-five which have been studied, the first series having been studied by means of fresh frozen sections of small pieces of the liver removed at the time of cholecystectomy. Most of the fresh specimens were utilized merely to obtain a preliminary plan for investigation of the problem. The specimens reviewed in the first series were too small for further study in a fixed condition. The fresh tissue examination revealed that many livers associated with cholecystitis were diseased.

A somewhat similar investigation was conducted by Graham in 1918; his series consisted of thirty cases of which detailed reports were made in eight. Graham's cases were subjects of acute cholecystitis and hepatitis. He states that 87 per cent of his series of cholecystitis was associated with enlarged livers and compares this high figure with that of Kehr who reported that from 15 to 20 per cent of cholecystitides is associated with hepatic enlargement. Ninety per cent of the gall-bladders operated upon at the Mayo Clinic are chronically inflamed. Thus in one series of 4,824 gall-bladders which have been reported, 4,430 or 91.9 per cent was chronically diseased. In the series of fifty-eight cases, herewith reported as having been studied in relation to hepatitis, 81 per cent showed chronic inflammation. The livers were studied independently of any knowledge of the condition of the gall-bladder. They represent portions of the liver near the gall-bladder and some distance away from it.

*The study of liver specimens removed at operation was made at the suggestion of Dr. Wm. J. Mayo who, with his associated surgeons, furnished the material.

†Read before the Southern Minnesota Medical Association, Mankato, Minnesota, November, 1920.

GALL-BLADDER

1. Subacute catarrhal cholecystitis associated with chronic catarrhal cholecystitis with partial destruction of mucosa. Thickened walls. Cholelithiasis (one stone in common duct and one in gall-bladder).
2. Chronic catarrhal cholecystitis. Cholelithiasis (multiple stones).
3. Slight chronic catarrhal cholecystitis.
4. Chronic catarrhal cholecystitis.
5. Chronic catarrhal cholecystitis papillomatosa ("strawberry" gall-bladder). Cholelithiasis (one stone).
6. Subacute cholecystitis (empyema). Cholelithiasis (one stone, 23x15mm.).
7. Chronic catarrhal cholecystitis (early "strawberry" gall-bladder). Bile sand.
8. Chronic cholecystitis with thickened walls. Scars of two perforations of the gall-bladder wall.
9. Cholecystitis. Gall stones.
10. Chronic catarrhal cholecystitis with thickened walls. Granular mucosa. Cholelithiasis.
11. Chronic catarrhal cholecystitis. Complete destruction of mucosa. Thin bile.
12. Subacute purulent cholecystitis with thickened walls. Partial destruction of mucosa. (Empyema). Cholelithiasis (stone in common duct).
13. Chronic catarrhal cholecystitis with multiple small stones.
14. Subacute cholecystitis associated with chronic cholecystitis with markedly thickened walls. Peri-cholecystitis. Cholelithiasis.
15. Chronic catarrhal cholecystitis (very early "strawberry" gall-bladder).
16. Chronic catarrhal cholecystitis (very early "strawberry" gall-bladder). Cholelithiasis. Dirty bile.
17. Chronic catarrhal cholecystitis with slightly thickened gall-bladder walls.
18. Subacute cholecystitis associated with chronic cholecystitis. Markedly thickened walls. Cholelithiasis.
19. Acute gangrenous cholecystitis with thick edematous gall-bladder walls. Dirty mucoid bile. Lymphocytic infiltration.
20. Chronic catarrhal cholecystitis ("strawberry" gall-bladder).
21. Chronic catarrhal cholecystitis.
22. Chronic catarrhal cholecystitis with multiple small stones.
23. Chronic cholecystitis papillomatosa.
24. Subacute purulent cholecystitis (empyema) associated with chronic cholecystitis. Markedly thickened gall-bladder walls. Cholelithiasis (multiple stones).
25. Slight chronic catarrhal cholecystitis.
26. Chronic catarrhal cholecystitis. Cholelithiasis (one stone, 3 cm. in diameter).
27. Chronic catarrhal cholecystitis. Ulceration and destruction of mucosa at fundus. Thickened walls of gall-bladder. Cholelithiasis (multiple stones).
28. Chronic cholecystitis with multiple scars in gall-bladder wall.
29. Chronic catarrhal cholecystitis with slightly thickened gall-bladder walls. Cholelithiasis (one stone, 2 cm. in diameter).

LIVER

Typical biliary cirrhosis showing large bile ducts and the portal vein surrounded by loose scar tissue infiltrated with leucocytes and rich in young, sprouting bile ducts.

Lymphocytic infiltration. Bile stasis.

Normal? Some crenation of the liver capsule and rather dense connective tissue around bile vessels. Some lymphocytic infiltration.

Normal? Slight lymphocytic infiltration.

Lymphocytic infiltration and fibrosis.

Marked fibrosis. Lymphocytic infiltration. Atrophy of liver cells.

Marked fibrosis and lymphocytic infiltration.

Lymphocytic infiltration. Vacuolization and disintegration of hepatic cells.

Marked hepatic intracellular pigment. Condition of small blood vessels suggestive of being the origin of the "syncytial" cells. Leucocytic infiltration. Extracellular pigment.

Lymphocytic infiltration? "Normal".

Lymphocytic infiltration.

Lymphocytic infiltration, fibrosis and atrophy of liver cells.

Marked lymphocytic infiltration, fibrosis, atrophy of cells. Distortion of tubules.

Lymphocytic infiltration. Atrophic blood vessels and fibrosis.

Lymphocytic and leucocytic infiltration. Atrophy and disintegration of liver cells.

Lymphocytic infiltration.

Fibrosis. Lymphocytic infiltration. Destruction of liver cells.

Atrophy and disintegration of liver cells.

Lymphocytic infiltration.

Vacuolization of liver cells. Marked lymphocytic infiltration. Atrophy of liver cells. Marked distortion of intracellular spaces.

Lymphocytic infiltration.

Lymphocytic infiltration.

Lymphocytic infiltration and fibrosis.

Marked fibrosis and lymphocytic infiltration.

Atrophy and flattening of liver cells. Marked thickening of Glisson's capsule. Lymphocytic infiltration. Hyalinized fibrosis around bile vessels.

Lymphocytic infiltration.

Lymphocytic infiltration. Some fibrosis. Small amount of leucocytes between liver cells. Thickened Glisson's capsule. Flattened liver cells.

Slight lymphocytic infiltration. Fibrosis. Hemosiderin present.

Marked lymphocytic infiltration. Some fibrosis.

30. Chronic cholecystitis. Cholelithiasis (multiple stones). Lymphocytic infiltration.
31. Chronic catarrhal cholecystitis. Some lymphocytic infiltration.
32. Chronic catarrhal cholecystitis (contracted gall-bladder). Cholelithiasis (one stone, 1 cm. in diameter). Irregular thickening of Glisson's capsule.
33. Chronic catarrhal cholecystitis (early "strawberry" gall-bladder). Fibrosis (early cirrhosis). Some lymphocytic infiltration.
34. Chronic catarrhal cholecystitis ("strawberry" gall-bladder). Slightly thickened gall-bladder walls. Cholelithiasis (stone, 3cm.x5mm.). Lymphocytic infiltration.
35. Chronic catarrhal cholecystitis (very early "strawberry" gall-bladder). Specimen unsatisfactory.
36. Acute cholecystitis associated with chronic cholecystitis with thickened gall-bladder walls. Cholelithiasis (multiple stones). Marked peri-hepatitis and lymphocytic infiltration of liver.
37. Slight chronic catarrhal cholecystitis. Cholelithiasis (multiple stones). Marked lymphocytic infiltration.
38. Chronic catarrhal cholecystitis with thickened gall-bladder walls. Trabeculation of mucosa. Cholelithiasis (multiple stones). Fatty degeneration of liver cells. Some lymphocytic infiltration.
39. Chronic catarrhal cholecystitis (early "strawberry" gall-bladder). Cholelithiasis (multiple stones). Marked lymphocytic infiltration.
40. Chronic catarrhal cholecystitis with partial destruction of mucosa. Thickened gall-bladder walls. Cholelithiasis (multiple stones, largest 2 cm. in diameter). Marked lymphocytic infiltration and some fibrosis.
41. Chronic catarrhal cholecystitis (early "strawberry" gall-bladder). Slightly thickened gall-bladder walls. Thick tarry bile. Some lymphocytic infiltration. Some fibrosis. Hemorrhage in liver substance.
42. Acute necrotic purulent cholecystitis (empyema). Cholelithiasis (multiple stones). Lymphocytic infiltration.
43. Acute purulent cholecystitis (empyema) associated with chronic cholecystitis with thickened gall-bladder walls. Cholelithiasis (one stone, 7 mm. in diameter). Slight lymphocytic infiltration. Glisson's capsule thickened. Marked fibrosis.
44. Chronic catarrhal cholecystitis (early "strawberry" gall-bladder). Marked lymphocytic infiltration. Fibrosis. Atrophy of liver cells. Proliferation bile duct.
45. Chronic catarrhal cholecystitis with areas of hyperplastic mucosa. Cholelithiasis (one stone, 1x1cm.x8mm.). Fistulous tract connecting with skin. Marked lymphocytic infiltration. Some fibrosis. Marked thickening of Glisson's capsule.
46. Chronic catarrhal cholecystitis. Very slight lymphocytic infiltration.
47. Chronic catarrhal cholecystitis with thickened gall-bladder walls. Contracted gall-bladder. Cholelithiasis (one stone from common duct). (Multiple stones). Marked lymphocytic infiltration. Marked destruction and atrophy of liver cells.
48. Chronic catarrhal cholecystitis. Cholelithiasis (multiple stones, largest 1 cm. in diameter). Lymphocytic infiltration. Fibrosis. Atrophy of liver cells.
49. Chronic catarrhal cholecystitis with thickened gall-bladder walls. Cholelithiasis (largest stone, 2 cm. in diameter). Marked, lymphocytic infiltration. Fibrosis. Flattening of liver cells.
50. Chronic catarrhal cholecystitis? Lymphocytic infiltration. Fibrosis. Flattening of liver cells.
51. Chronic catarrhal cholecystitis ("strawberry" gall-bladder). Lymphocytic infiltration.
52. Slight chronic catarrhal cholecystitis. Extensive subcapsular lymphocytic infiltration and fibrosis. Peri-ductal lymphocytic infiltration. Fibrosis.
53. Chronic catarrhal cholecystitis. Cholelithiasis (multiple stones). Lymphocytic infiltration.
54. Chronic catarrhal cholecystitis. Lymphocytic infiltration. Fibrosis.
55. Chronic catarrhal cholecystitis. Subcapsular hepatic cellular atrophy.
56. Chronic catarrhal cholecystitis. ("strawberry" gall-bladder). Inter-cellular hepatic lymphocytic infiltration and fibrosis. No peri-ductal infiltration or fibrosis.
57. Chronic catarrhal cholecystitis with thin gall-bladder walls (cystic). Cholelithiasis (one stone, 1.5 cm. in diameter completely obstructing cystic duct). Lymphocytic infiltration. Fibrosis. Cellular atrophy.
58. Subacute cholecystitis associated with chronic cholecystitis with thickened gall-bladder walls. Peri-cholecystitis with adjacent hepatitis. Cholelithiasis (one stone, 1.5 cm. in diameter) Cholecysto-duodenal fistula. Lymphocytic infiltration, fibrosis and hepatic cellular atrophy.

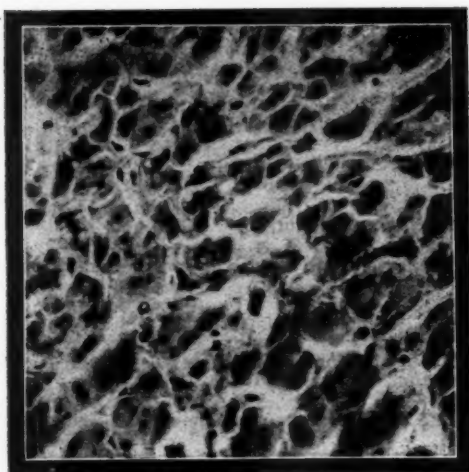


Fig. 1.

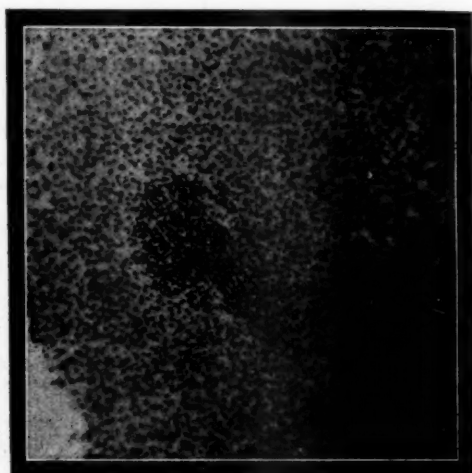


Fig. 3.

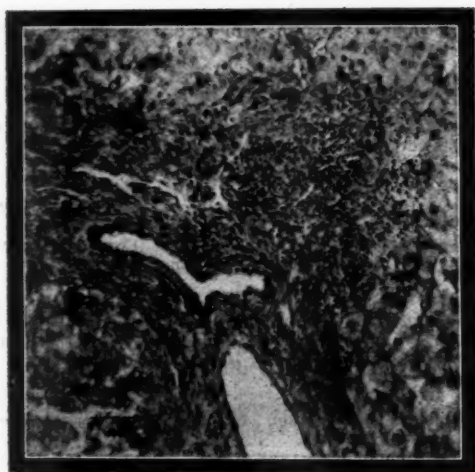


Fig. 2.

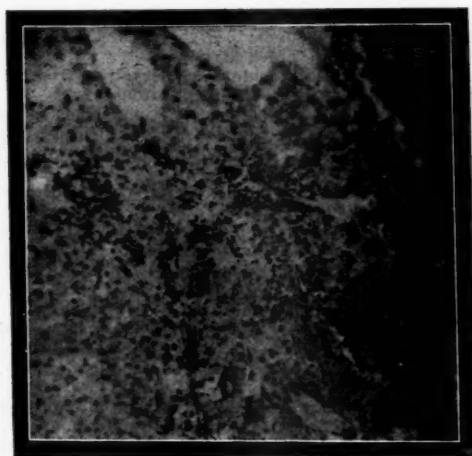


Fig. 4.

Figs. 1, 2, 3, 4. Photographs showing degrees of lymphocytic infiltration, fibrosis and hepatic cellular distortion in chronic hepatitis associated with chronic cholecystitis.

The inflammatory reaction in the liver may be summarized by stating that it consists of peri-ductal lymphocytic infiltration, and fibrosis, both processes sometimes extending between the columns of liver cells, which are occasionally atrophic, vacuolated, or distorted. Extra- and intra-cellular pigment is occasionally present, and small bile ducts are sometimes partially destroyed. The reaction varies in amount, the degree of reaction apparently bearing no direct re-

lationship to the degree of reaction in the gall-bladder.

This study and that of Graham has one fault, i. e., that the left lobe of the liver was not studied as a control in all cases. However, this series embraces many specimens which were taken some distance from the gall-bladder which indicates that if the inflammatory reaction is direct from the gall-bladder by continuity then a large portion of the liver is frequently involved

in cholecystitis, a fact to be considered in treatment, the liver being, therefore, also a focus of infection as well as a possible source of general disturbance from interference with normal hepatic functions. Such a condition, remaining in the liver after cholecystectomy or cholecystostomy, might readily explain, at least in part, the fact that some cases, following cholecystectomy or cholecystostomy, continue to have trouble, indeed "attacks" similar to their pre-operative attacks.

CONCLUSIONS

1. Chronic cholecystitis is very frequently if not always associated with chronic hepatitis.

2. The fact that chronic hepatitis is an almost constant finding in cholecystitis suggests that the general obscure symptoms which frequently occur in association with cholecystitis may have their origin in chronic disturbances of hepatic functions.

3. The presence of chronic hepatitis in association with chronic cholecystitis may account for the recurrence of symptoms following a certain percentage of cholecystectomies and cholecystostomies.

BIBLIOGRAPHY

1. Graham, Everts A.: Hepatitis; a constant accompaniment of Cholecystitis. *Surg., Gynec. and Obst.*, 1918, xxvi, 521-537.
2. MacCarty, Wm. C.: The pathology of the gall-bladder and some associated lesions. *Ann. Surg.*, May, 1910, li, 651-669.
3. MacCarty, Wm. C.: Classification of appendicitis; relation of chronic appendicitis to obliteration of the lumen, carcinoma, and disturbances in the gastro-hepatico-duodeno-pancreatic physiologic system. *Jour. A. M. A.*, Aug. 6, 1910, 448-491.
4. MacCarty, Wm. C.: Relation between appendicitis and disturbances in the gastro-duodeno-hepaticopancreatic physiologic system. *Ann. Surg.*, Dec., 1910.
5. MacCarty, Wm. C., and Corkery, John: Early lesions in the gall-bladder. *Am. Jour. Med. Sci.*, May, 1920, p. 646.

DISCUSSION

DR. H. E. ROBERTSON, Minneapolis: I am sorry Dr. MacCarty did not discuss the relation between acute hepatitis and chronic hepatitis. When we perfuse an animal's liver with fluid containing micro-organisms, the fluid coming out of the liver contains fewer bacteria because they are taken up by the endothelial cells lining the liver sinusoids. If these bacteria proliferate, there will be injury to the liver cells adjacent to them, and later on fibrosis. Those changes which go on in the liver go on in the spleen,

in the appendix and related structures. As pointed out a number of years ago, they go on constantly during our lives, and it is in the resultant chronic conditions that we have made less progress than in any of the infections with which surgeons and medical men have to deal. We conclude that chronic conditions are in a class by themselves; probably they are not caused by bacteria and we talk vaguely about poisons that are absorbed from the gastrointestinal tract, about the drunkard's liver, and so on. There is no question in my mind but what bacteria of a low grade of virulence may do damage constantly or may have done a small amount of damage, and that keeps on recurring from time to time.

The relation and association of these organs with pathologic micro-organisms is always apparent as Dr. MacCarty has plainly shown; that is, if we have one diseased organ in the body, the chances are that diseased organ will be an index of what may occur in neighboring related organs. The removal of the source of this infection if we can only find it, is the ideal to be desired, and oftentimes the removal of the gall-bladder proves that very thing. We must not forget also that the liver is capable of repair, and the removal of the source of infection may make possible a repair that will preserve normal vital functions.

In regard to the essential relation of these lesions, Dr. MacCarty has pointed out that almost every single liver in individuals passed the age of 40, the same as every single aorta in individuals of the same age, showed chronic changes. There is more or less disease always present in so-called normal individuals above 40. Such a fact should make us careful in our estimation of complicating condition found at surgical operations.

DR. MACCARTY (closing the discussion): There is one false clinical deduction which some one is going to make as the result of the report of these cases, and that is the reason I did not say too much. A long paper might have been written on the subject from our experience; but I merely made a report of the findings, and we may draw conclusions sometimes later.

Some one will say, why remove the gall-bladder if the liver is diseased? I am going to answer that by saying, why remove a small carcinoma of the breast when you know there is a possibility of carcinoma being somewhere else in the body? If the gall-bladder is the seat of infection, take it out. If you cannot take out the liver, there is no reason why you should not take out the gall-bladder. We must still continue to do cholecystectomies and cholecystostomies in spite of the fact that the liver is frequently involved. We must not draw a false clinical deduction which we might easily do.

Another point which was brought up is that there is one great failure in surgery, as it has been ordinarily practiced. For instance, given a duodenal ulcer, the surgeon does gastroenterostomy, turns the patient loose, and later the patient returns with all of the symptoms he had before operation. I do not believe

that is the proper way to do surgery. I do not believe it is proper to do cholecystectomy and dismiss the patient without some instructions, because when you remove the gall-bladder, you are not always removing the etiological factor in cholecystitis. Every surgical patient should also be treated as a medical patient, and his general condition should be taken care of, and a real surgeon I think will always do that.

I shall not go into that phase of the discussion which was alluded to by Dr. Robertson, namely, about the chronic changes which go on in a series of organs as that is a long story, and if I had time I should like to show some lantern slides. I have presented observations which show that diseases in these various organs, if we take their histories into consideration have an onset which appears in certain sequence, so that from the laboratory, as a matter of experiment, we have frequently taken the age of the patient and a history abdominal disturbances and prophesied the pathologic findings which we would find in the operating room, and I do not say we are 100 per cent correct but we were correct in a high percentage of cases. That is one of the interesting features in connection with the pathology and with our association with surgeons; we can correlate the surgical findings with the pathology which we see in the laboratory. It makes us better pathologists as well as helps the surgeon.

PHYSICAL SIGNS OF EARLY PULMONARY TUBERCULOSIS*

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Early pulmonary tuberculosis may mimic any disease the thoracic viscera are heir to, consequently the detection of early tuberculosis is not an easy task; on the contrary, one requiring great care in order to minimize error.

The first diagnostic step in the examination of a tuberculous suspect is a careful, painstaking history, including symptomatology. The second diagnostic step is a thorough physical examination. The third step is the application of the laboratory tests—examination of the sputum, use of tuberculin and the x-rays.

Inspection. The general appearance of the patient as evidenced by his nutrition, color of skin, facial expression, attitude, and type of chest, means much to the experienced clinician, and often tips the balance in favor of a correct diagnosis. Inspection of the chest should be

made with the entire thorax bare in the case of males and with a light covering of the lower half of chest in females.

The condition of the circulatory system should be ascertained before investigating the respiratory system. The irritable heart, accentuated pulmonary second sound, characteristic pulse, and low blood pressure are valuable early signs. The upper respiratory tract, nose, throat and sinuses, should be carefully investigated before proceeding with the chest examination. In incipient tuberculosis inspection of the chest is practically negative unless there has been a previous pleurisy.

The respiratory movements should be carefully noted,—slight lagging on the affected side occurs early, especially noticeable in the female owing to superior costal type of breathing. Expansion becomes more and more diminished over the affected side and more distinctly apparent owing to superior costal type of breathing. Expansion becomes more and more diminished over the effected side and more distinctly apparent, owing to increased functional activity of the other lung as the disease advances.

Thermometry affords valuable information if systematically carried out; increased afternoon temperature is an early symptom, often preceding for a considerable time cough, expectoration, or the presence of tubercle bacilli. The temperature should be taken at least four times daily for a period of several days.

Palpation confirms inspection as to findings and enables us to definitely locate areas of increased fremitus, providing we bear in mind the slight normal increase of fremitus over the upper portion of right lung. (Palpation is of little value in the detection of early tuberculosis).

Diminished unilateral expansion or lagging is elicited best by standing behind the patient and grasping the upper portion of the chest, thumbs posteriorly and the palmar surface of the fingers pressed against the upper portion of the anterior chest. Palpation may also elicit muscle spasm over the involved side.

Percussion should be carefully and systematically performed during quiet breathing, and at the end of both expiration and inspiration, varying the force and direction of the percussion stroke over the entire lung area. The existence

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normally of a slightly higher pitch of the percussion note over the upper portion of the right lung should be borne in mind. Owing to the small size and often deep location of tuberculous areas, relaxation of surrounding healthy tissue results, which gives rise first, not to dullness but to a slightly tympanitic note; later, as the consolidation increases in degree and extent, tympany is replaced by slight dullness. Finger-finger percussion has the added advantage of enabling the clinician to estimate tissue resistance, often of more importance than the percussion note.

Auscultation is the court of highest appeal, since it furnishes us the earliest as well as the most direct and valuable evidence on which to base a diagnosis of early tuberculosis. It should include the careful investigation of the breath, voice, cough, and adventitious sounds, bearing in mind the fact that the respiratory murmur is slightly harsher, higher in pitch and of greater intensity on the right side, especially over the upper portion of the lung.

The earliest pathologic change in the respiratory sounds due to tuberculous infiltration will be found to be diminished intensity of breath sounds or slightly increased harshness noticeable during the slightly prolonged and higher pitched expiration. Interrupted or cog-wheel respiration has but little diagnostic significance, unless supported by other evidence of disease.

Accompanying the slight changes in the breath sounds, on requesting the patient to breathe deeply or to cough, a few feeble, distant crepitant or subcrepitant rales are heard. As a rule localized crepitant rales are best elicited by the post-tussive method—breathe out, cough, and quickly breathe in, continue as stethoscope is moved from point to point over the apices. In some patients you develop crepitation more distinctly at the end of deep inspiration, or during the forcible cough immediately following a deep inspiration. These early adventitious sounds, if localized and persistent, point very definitely to tuberculous infiltration. Over the affected area the voice sounds early show increased intensity, later a raised pitch; especially is this true of the whispered voice.

Given a history of one or more hemorrhages, of pleurisy, or of fistula in ano, the presence of cough, with or without expectoration, loss of

weight and strength, increased pulse rate and slight afternoon temperature, with localized, moist rales in the upper portion of one lung, regardless of sputum findings, you are dealing with active or clinical pulmonary tuberculosis, which will be confirmed by tuberculin and the radiograph. We should also bear in mind that the patient free from cough, temperature, loss of weight, and with a normal pulse rate is free from active pulmonary tuberculosis.

Differential Diagnosis. Early pulmonary tuberculosis may be confused with pulmonary syphilis, influenza, maglinant disease of the lung, actinomycosis, and pneumoconiosis.

Pulmonary syphilis is not a common disease, but is liable to be confused with tuberculosis, especially if it involves an upper lobe. We are not permitted to select our ancestors, consequently anyone may be infected with syphilis; and no one is able to control his early environment, hence anyone may have tuberculosis, or the individual may suffer from both infections at the same time. Tuberculosis usually begins at the apex, syphilis at the base or hilus.

Given a case resembling early tuberculosis, in which tubercle bacilli are persistently absent from the sputum, general nutrition good, absence of temperature, dyspnea out of proportion to the lesion, absence of localized crepitation, free apices, positive Wassermann and negative tuberculin test, you are dealing with pulmonary syphilis.

Influenza in the form of post-influenzal lung, is frequently mistaken for tuberculosis. It is characterized by localized crepitant and subcrepitant rales, occasionally limited to the upper portion of one lung, but more often scattered throughout the lung, accompanied by cough, expectoration, and temperature, thus presenting a clinical picture not unlike that of early tuberculosis. Fortunately the pulmonary sequelae of influenza are very seldom tuberculous in character. Fishberg states that of the hundreds of cases of influenza coming under his observation during the late war, in which cough, expectoration, and temperature persisted after influenza, but one proved to be tuberculous.

Malignant disease of the lung, carcinoma, or sarcoma, may be either primary or secondary, the latter occurring in early life, the former late in life. The clinical history is one of irritable,

unproductive cough; dyspnea progressive in character, increasing on exercise; temperature tardy in appearance but present sooner or later. Pain is present, accompanied by a feeling of fullness and constriction within the chest. Hoarseness and aphonia are present if the recurrent is involved. The physical signs will depend largely on where the growth is situated. Diminished expansion over the involved side, palpable supraclavicular and axillary glands, dullness and increased resistance on percussion, accompanied by diminished breathing and adventitious sounds on auscultation comprise the early physical signs. The early differential diagnosis of primary cancer of the upper lobe from early tuberculosis is often a difficult task.

Pneumoconiosis, an occupational disease caused by the inhalation of inorganic dust, and characterized by pulmonary fibrosis, is frequently confused with early pulmonary tuberculosis. The patient's occupation, the tendency to early hilus fibrosis and more marked changes, usually in the right lung as shown by the radiograph, and persistent negative sputum, all point emphatically to pneumoconiosis.

Pulmonary actinomycosis may arise through inhalation of dust or secondarily by extension from the neck. It is characterized by cough, often blood-tinged expectoration, irregular fever, loss of flesh, presence of actinomycetes in the sputum, and persistent absence of tubercle bacilli.

I recall hearing that prince of clinicians, Sir William Osler, once say that when we think of tuberculosis, cancer, or syphilis we should also think of the possibility of actinomycosis.

The writer holds that bronchitis, bronchiectasis, broncho-pneumonia, and lobar pneumonia have little in common with early pulmonary tuberculosis, consequently need not be considered at this time.



CLASSIFICATION AND SYMPTOMATOLOGY OF PULMONARY TUBERCULOSIS*

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CLASSIFICATION

The satisfactory classification of tuberculosis for general use and acceptance has always been a difficult task. As knowledge of the disease progressed, such men as Bayle, Laennec, Grancher, Frankel, Meissen, Sokolowski, Loomis, King, Williams, Cornet, Turban, Brown, Trudeau, Rathbun and others have set forth their ideas attempting a working classification with the information at hand. To classify not too arbitrarily a disease with such protean manifestations and with such wide discrepancies between clinical and pathological activity especially since the x-ray has entered the field of diagnosis, has been recognized as one of the problems of the National Tuberculosis Association. To use a terminology and classification of clinical groups which are produced by the reciprocal action between the severity and channels of infection, virulence and dosage on the one hand and the resistance of the organism on the other, offers considerable difficulty.

Dr. E. R. Baldwin, acting as President of the National Association, appointed a Diagnostic Standards Committee. With the cooperation of the Framingham Community Health and Tuberculosis Demonstration representatives, this committee prepared with considerable work, a set of standards for diagnosis and classification. Dr. W. L. Rathbun very happily suggested a separate grouping of lesions and symptoms making it possible to classify any case according to the exact pulmonary involvement and nature of symptoms. Any case of tuberculosis may be labeled exactly by this method which has been adopted by the American Sanatorium Association.

This schema admits of the following combination.

LESIONS

Incipient. Slight infiltration limited to the apex of one or both lungs, or a small part of one lobe; no tuberculous complications.

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Moderately advanced. Marked infiltration, more extensive than under incipient, with little or no evidence of cavity formation; no serious tuberculous complications.

Far advanced. Extensive localized infiltration or consolidation in one or more lobes; or disseminated areas of cavity formation; or serious tuberculous complications.

SYMPTOMS

A. (Slight or None) Slight or no constitutional symptoms, including particularly gastric or intestinal disturbance, or rapid loss of weight; slight or no elevation of temperature or acceleration of pulse at any time during the 24 hours; expectoration usually small in amount or absent; tubercle bacilli may be present or absent.

B. (Moderate) No marked impairment of function, either local or constitutional.

C. (Severe) Marked impairment of function, local and constitutional.

The above practical arrangement is an improvement on the older ones such as the much used lobe classification of Turban which is based on physical signs alone. Although it does not include a working application of the x-ray diagnosis of the stage of the disease it does admit of such a classification being added such as the following suggested by L. Brown, Heise and Sampson who, however, prefer the word minimal to incipient since the latter implies time.

I. INCIPIENT (OR MINIMAL):

X-ray findings to show a total area involved (parenchymatous) not greater than the area to the level of the second chondrosternal junction on one side (both sides may be involved) in the form of scattered mottling, or an intense shadow interpreted as pleuritic.

II. MODERATELY ADVANCED:

X-ray findings to show an intense shadow, not interpreted as pleuritic, of no greater extent than the area above the upper level of the fourth chondrosternal junction on one side; or areas of rarefaction interpreted as cavities limited to one interspace; or scattered mottling over a greater area than under Minimal, but not greater than the area of one entire lung and to the level of the second chondrosternal junction on the opposite side.

III. FAR ADVANCED:

X-ray findings to show an intense shadow, not interpreted as pleuritic, of greater extent than

the area to the level of the fourth chondrosternal junction, or areas of rarefaction interpreted as cavities, greater than one interspace, or scattered mottling greater in extent than under moderately advanced.

SYMPTOMATOLOGY

The diagnosis of early pulmonary tuberculosis belongs to the general practitioner. The clinician and patient are concerned chiefly with active tuberculosis and only indirectly with infection.

Out of a hundred patients that the clinician will examine probably seventy will have a tuberculous infection and of the seventy infected about four or five have or will develop the disease tuberculosis. As a physician he is interested in the marks of infection but he is deeply concerned in recognizing the early manifestations of the few diseased. The greatest progress will be made when every physician can recognize these early symptoms and signs that in a great measure enable him first to sort the diseased from the infected and second to be able to diagnose tuberculosis early enough to do the patient some good. It is not the physician who uses hair-splitting methods to detect the slightest lung changes or the one who gives a knowledge of the incidence of tuberculous lesions or even the one who attempts to determine those who will subsequently develop pulmonary tuberculosis who is going to do the most good.

Old burnt-out lesions, the only evidence of previous infection, are almost universally present and as such offer difficulty in the diagnosis of the disease. The physical examination in the diagnosis of tuberculosis, therefore, takes its value only when correlated with the associated symptoms and signs. As Lawrason Brown points out, symptoms indicate that a patient is sick while physical signs show only the mischief done, the former being a better and more active guide to activity than the latter. Furthermore, symptoms without physical signs demand treatment but physical signs without symptoms frequently require only careful watching. Symptoms tell us what is happening and the general condition is more important than the history or the physical signs. Dr. Trudeau used to say to his patients, "I am not concerned about the extent of your disease so much as about how you are taking care of it and how you are feeling."

The x-ray often reveals and localizes the pathological changes in the lungs when not detected by other means but it does not give us clinical activity of significance unless accompanied by symptoms. Its value then lies chiefly in negating tuberculosis when suspicious symptoms are present and also in furnishing valuable confirmatory evidence in the presence of symptoms. If we teach the practitioner that the early diagnosis of tuberculosis depends entirely upon physical signs and the x-ray too many physicians will be tempted to install equipment that may prove inferior in quality or unsatisfactory because expert skill and long practice are necessary before it can be used efficiently. Many a patient would be spared the sanatorium or the unhappy road to neurasthenia if this were more universally recognized.

What then are the symptoms, the clues that a patient gives when he presents himself that justify one in diagnosing active tuberculosis? The *family history* of consumption, especially where there has been a prolonged and intimate exposure, particularly in early life and to immediate relatives, nurses, nursemaids and attendants, or continuous exposure anywhere where debilitating conditions favor development of a former infection, is of paramount importance. It must be remembered also that the exposure may be to bovine or human sources.

Of the local symptoms *chest pains* may be early and troublesome. They are usually associated with pleurisy and may be either sharp and stabbing in character and also either constant or felt only during coughing. The pain is usually in the lower thoracic zone but may occur beneath the scapula or be referred to the apex. A typical pleurisy with effusion is considered presumptive evidence of tuberculosis and occurs mostly in the paranchymatous type. At the least, one-third of these cases subsequently develop pulmonary tuberculosis. A dry pleurisy is considered evidence of slight tuberculosis. In other words, pleurisy not following pneumonia but coming on insidiously should be treated as due to tuberculosis for a while at least.

A persistent *cough* lasting a month or longer with or without expectoration is very common in early pulmonary tuberculosis and requires investigation, although there is no cough characteristic of the disease and activity may exist

without it. In the early stages the cough is frequently dry and hacking and usually is bronchial in origin. In certain cases of bronchial gland tuberculosis there may be a brassy strident paroxysmal cough resembling that of pertussis.

Sputum is not necessarily present, but constant or occasional morning expectoration with or without cough should have attention. Absence of bacilli after one or several examinations is not proof against the presence of active disease. It means only that there is no bronchial ulceration. Sputum is comparatively rare in tuberculosis in childhood.

Blood-spitting even so much as a teaspoonful when raised from the lungs with or without sputum should be called tuberculosis until ruled out as caused by other conditions such as mitral stenosis. Blood streaks or spots may or may not mean tuberculosis. Hemoptysis in apparently young healthy persons has not infrequently been the first symptom of the disease. More often it occurs after considerable exertion or after failing health for a month or two. The bleeding of early pulmonary tuberculosis is usually slight but is likely to recur. Hemoptysis occurs about nine times as frequently in the parenchymatous as in the peribronchial type.

A slight *dyspnoea* on exertion may occur in early phthisis although it is usually associated with more extensive disease.

Hoarseness or a persistent *huskiness* needs attention. This is a rare symptom in childhood.

Of the general symptoms, *fever* is the most important initial one and in the early stage when tubercles are forming it is a constant symptom. In adults a slight but persistent rise in temperature over 99.4 degrees F. when taken by mouth for five minutes and at least four times daily over a period of a week is significant and should constitute *fever*. In very young children rectal temperature only is dependable. To have fever in a child, in a pathologic sense, there must be more or less constant elevation of temperature over 100 degrees taken at various times during the day and lasting over a period of at least a week. An occasional temperature of 99 should not be considered fever. And it must also be remembered that non-tuberculous focal infections and other toxic states can produce a fast pulse and elevation of temperature. Endocar-

ditis, hyperthyroidism, sinus infection, and pyorrhea alveolaris have been misleading. If due to tuberculosis the temperature and pulse usually are increased after exercise; they show a tendency to rise if the exercise is continued and they respond to rest. Rarely in the early stages is there a subnormal early morning temperature without an increase of more than a degree and a half during the twenty-four hours. A slight elevation of temperature when not associated with other symptoms and in the absence of physical signs loses considerable of its significance in the diagnosis of fresh tubercle.

A pulse should be considered abnormal when there is an increase of fifteen beats per minute above the average normal known pulse of a patient during various periods of the day, while at rest at home. An average pulse of 85 or over in men and 90 or over in women when at rest should be considered abnormal. Of special significance is a fast pulse associated with a subnormal temperature. In children a wider latitude of pulse should be allowed as this varies with the age. And observations should be over a longer period of time before it becomes a significant symptom.

An unexplained loss of weight of at least 5 per cent below normal during a period of time varying from four to six months is a common accompaniment of early active tuberculosis. In children, failure to gain weight for a period of four months or longer without definite cause is suspicious. Also a patient who develops pulmonary tuberculosis will often have a usual weight of ten pounds below the normal for his age and height.

Loss of strength or undue fatigue often accompanies this weight loss. Lack of staying power which is unusual for an individual child and cannot be satisfactorily explained is suggestive.

Sweating is present in a high percentage of the active cases and may occur early in the disease. These sweats generally take place during the night after the drop in temperature or in the day if the patient sleeps.

Migratory pains in the chest and shoulders, loss of color, digestive disorders, or the presence of tuberculosis elsewhere in the body such as in the glands, bones, joints, et cetera, should cause one to inquire into chest symptoms. A discharging ear coming on painlessly, fistula in ano, a

chronic epididymitis, are strongly suggestive of tuberculosis which should be looked for in the lungs.

In conclusion, when any one or more of the symptoms mentioned are present, a correct diagnosis can only be reached by means of common sense judgment after carefully considering the multiple minor signs and symptoms, both local and constitutional, which are frequently present and must be given their relative significance. In all cases in doubt especially in children when it is best to make a provisional diagnosis and give the patient the benefit of hygienic measures and prolonged observation although this does not necessarily mean that the patient be sent to a sanatorium or hospital or be definitely stamped as a consumptive.

J. H. Pratt and L. Brown, while serving on the Examining Board at Camp Devens during the late war, analyzed the records of 500 drafted men examined routinely for tuberculosis to obtain the incidence of symptoms. Besides the family history of consumption which 7.4 per cent gave, the percentage of cases showing symptoms were: (1) Cough lasting a month or more, 11.8 per cent; (2) Night sweats, 8.2 per cent; (3) Loss of weight for a period of six months, 7.4 per cent; (4) Pleurisy, 5.6 per cent; (5) Blood-spitting or blood streaked sputum at some time, 4.6 per cent. Thus by means of a simple questionnaire of subjective symptoms the men were sorted who would be expected to show objective signs. Of a series of cases with evidence of tuberculosis on physical examination about 78 per cent had one or more symptoms suggesting the disease. It would have been impossible to x-ray those hordes of men among whom infection was inevitable and universal but disease accidental. Those diseased had to be detected early and rapidly as the time allotted for examination was very limited and the weak could be held back and the strong sent overseas. The symptomatology held the key to this situation.

For several years to come we must not overlook the patient's history of having had influenza and his inability to gain strength since that time. We must also bear in mind in the diagnosing of the bugbear of cases the peribronchial type, that it is a good rule to look with suspicion upon cases in which the subject shows constitu-

tional depression and marked signs of ill health with only a small and apparently unimportant superficial lesion.

I have not discussed in detail the train of symptoms which many dwell upon as early manifestations of concealed or occult tuberculosis, such as low blood pressure, the so called neuro-circulatory asthenia, the effort syndrome, certain nervous manifestations, viscerosensory reflexes, amenorrhea, digestive disturbances etcetera, as these occur not only in early tuberculosis but in other diseases as well. When the cardinal symptoms or the symptoms per se are present they are valuable as confirmatory evidence—the finishing touches of an outlined picture.

FURTHER NOTES RELATIVE TO ROENTGEN DIAGNOSIS OF TUBERCULOSIS*

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It is not the writers purpose at this time to attempt any new observations relative to the diagnosis of tuberculosis, but rather to assemble and emphasize those which experience has proven of value; and to try to remove certain false conceptions which seem to prevail in the medical mind upon this important subject.

During the past eight years the writer has studied, with an open mind, several thousand stereo-roentgenograms of lungs in which tuberculous infection was suspected. And the conviction has developed the strength of a certainty that definite objective signs of the disease are to be found in every case of clinical tuberculosis. The correct interpretation of these signs, however, is possible only after extensive experience, and however experienced one may be he is never entirely free from the danger of error. In other words, it may be said that the x-ray diagnosis of pulmonary tuberculosis must still be regarded as an art rather than a science. If this is true, the corollary statement that the roentgen diagnosis must be checked and supplemented by as much clinical evidence in the case as can be assembled, must also be accepted. Nevertheless, if we appraise the x-ray method by the same

standards that apply to other clinical methods it is unquestionably the most important.

The negative diagnosis, when made in the absence of all signs of lung disease, should outweigh all other clinical evidence however conclusive it may seem to be. When signs, more or less characteristic of pulmonary tuberculosis are present in the stereo-roentgenogram and a positive diagnosis of tuberculosis is based thereon, the latter should be accepted merely as presumptive proof of the disease to be ruled out if possible by more careful clinical observations.

The writer confesses that he has in certain other communications attempted to show that there are certain pathognomonic roentgen signs of pulmonary tuberculosis. There was much clinical support for such a claim and much statistical evidence was found to support it. In the light of accumulated experience, however, the writer believes it safe to say there are no roentgen signs of tuberculosis sufficiently characteristic to be called infallible. Those signs which we have come to regard as most characteristic of active tuberculosis are probably due to lymphatic engorgement or active congestion in the parenchyma of the lungs, and these changes are, of course, to be found in other chronic conditions. There remains the somewhat typical distribution of these changes which tend to give the lung shadows a cone-shaped formation with apex toward the hilus. But this formation has been found to prevail in a very typical manner in the roentgenograms of granite workers, suffering with a certain type of pneumoconiosis. In character, they are not unlike the patches of bronchopneumonia observed in the influenza epidemic of 1918, but they tend more to assume the characteristic cone-shape, with base toward the pleura and are usually less dense. There is often a tendency for these changes to gradually disappear as the disease in this area becomes more and more quiescent; and one may thus observe every gradation from the bronchopneumonia-like patch to a clear and normal appearing lung area, with perhaps a few discrete sharply defined shadows remaining. The writer regards it unsafe to make a negative diagnosis as to the presence of pulmonary tuberculosis while these peripheral shadows, even though atypical, are present in the upper part of one or both lung fields. On the other hand, hilus thickening and

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peribronchial infiltration seem to be caused more frequently by focal infection, dust inhalation, or other bronchial irritants.

It is extremely doubtful whether the roentgen diagnosis of peribronchial or hilus tuberculosis in the adult is ever justified. If this disease ever manifests itself purely in these forms, which the writer has much reason to doubt, it has no characteristics here which serve to differentiate it from the more common streptococcus invasions. In early childhood tuberculosis is the most common cause of enlarged hilus glands, but even here a diagnosis based upon this evidence requires the additional support of clinical history and the Von Priquet reaction.

The common appearance resulting from the milder forms of gas poisoning is a diffuse mottling of the lung fields limited to the distribution of the bronchial tree. The more gross changes due to mixed infection which are usually present in the moderately advanced cases of pulmonary tuberculosis may so cover up and mask the tuberculous lesion that the roentgen diagnosis is made more difficult. Yet a careful study of every part of the roentgenogram in such a case will almost invariably reveal some area in which the tuberculous changes are typical. Thus, while it is doubtless true that there are some cases in which a positive roentgen diagnosis may be made, even in the absence of clinical evidence, the possibility of error should be constantly borne in mind and emphasis placed upon the importance of correlating all available data as a practical routine procedure. Even the most typical roentgen signs of tuberculosis may be so closely simulated by other lesions that they must be interpreted in the light of case history, physical findings and laboratory observations. We no longer demand that the laboratory pathologist shall be able to deduce from the unaided examination of a piece of tissue all of the case history of the patient from whom it was removed. And time has come to place roentgen diagnosis in its proper place among the important diagnostic measures, none of which should be accepted alone as infallible.

The epidemic of streptococcus pneumonia offered an unusual opportunity to study the acute lesions of this type of infection and the residual changes persisting for months and even years after recovery from the acute attack are similar

to the changes previously described by the writer and attributed to chronic pulmonary streptococciosis. Likewise the writer's contention that the presence of such lesions renders the recognition of the early tuberculous changes much more difficult, either by masking or simulating them, has been abundantly supported by the more recent experience of others.

Much has been said during the past year or two about diffuse infiltration of syphilis, as distinguished from gumma. The changes are said to closely simulate tuberculosis. In 1915 the writer mentioned this possibility since some of these shadows certainly disappeared under antiluetic treatment. However, all such discussions must continue to lack force until the spirochete has been proven to be active in the lung without producing gumma.

If we confine our differential diagnosis to those conditions which often produce demonstrable changes in the upper lung fields, one basic observation is worthy of note i. e., the early changes of tuberculosis are characterized by low density values requiring not only an excellent quality of stereogram, but the most careful study for their demonstration. Other infections, pneumoconiosis and malignant metastases tend to produce more gross and massive changes while the dissemination is usually more widespread. As a broad working rule, therefore, it may be said that the more film or veil-like the shadows observed the more the probability of tuberculosis. It must also be borne in mind that tuberculosis tends to unilateral distribution while other chronic lesions from which differentiation must be made are all more likely to be bilateral. Add to this characteristic the distribution of radiographic changes in the lung periphery, beyond the extension of the finer bronchioles, especially in the first and second interspaces or in the apex of the lower lobe, with the formation of one or two cones; and the evidence is about all in for the differential diagnosis of early pulmonary tuberculosis.

Advanced pulmonary tuberculosis is sometimes more difficult to differentiate than early forms because here, the changes being more gross, more closely simulate those of other diseases like pneumoconiosis. Here too we have the mixed infections which cover up and mask the more characteristic early manifestations. In

the advanced forms however, we are protected from error by the more marked clinical manifestations and by the fact that we can usually find some field of lesser involvement where the changes are more typical.

It cannot be too strongly emphasized that an early roentgen diagnosis of pulmonary tuberculosis depends above all upon stereograms of high quality. The most experienced diagnostician cannot read poor plates, and if the best cannot be obtained, the method must be relegated to a position of secondary importance. It seems necessary to stress this point because one so often sees a negative or positive diagnosis based upon a so called interpretation of plates so lacking in detail that the slight changes due to early pulmonary tuberculosis would surely not appear even though the disease were present.

Fluoroscopy is far more limited in its application to the diagnosis of this disease. Surely one cannot hope to differentiate by the fluoroscope the various chronic lesions which decrease the air volume in a given part of the lung and thereby increase the relative density thereof. And it is equally certain that the earlier changes will usually escape detection upon the fluoroscopic screen.

One field of unquestionable usefulness in which the roentgenographic study has no competitor is that of practical classification. Both prognosis and treatment are almost wholly dependent upon an accurate determination of the extent of involvement, presence or absence of cavitation, amount of fibrosis and degree of chronicity. In such a classification the roentgenogram knows no peer and were it proven valueless in all other respects, this fact alone would demand its assistance in all known cases of pulmonary tuberculosis.



SPASMODIC STENOSIS OF THE ESOPHAGUS*

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In recent years there has been a great deal of interest manifested in diseases of the esophagus. This is due to the development of more accurate methods of study, for there had been very little advance made in the diagnosis of these diseases until the x-ray and endoscopic methods of study were introduced. Until this time there had been very few references made to spasmodic disease of the esophagus but, with these more accurate methods of study, we find that spasmodic stenosis of the esophagus is mentioned quite frequently.

The factor of spasm enters into nearly every condition of the esophagus. Any one who has done endoscopic work realizes the frequency with which spasm occurs in the presence of foreign bodies in the esophagus and also in many of the organic diseases. Clinically, we may classify spasmodic stenosis into spasms of the upper and spasms of the lower end of the esophagus. Rarely do we see a spasm in the middle third and only when it is associated with some organic disease. However, this classification into high and low spasm will not always hold good as both may be present at the same time.

In 1882, Mikuliez attributed idiopathic dilatation of the esophagus to cardiospasm and in 1888 this view was corroborated by Metzler. That cardiospasm was the etiological factor in idiopathic dilatation of the esophagus was not generally accepted at this time and it was attributed to many rather indefinitely understood causes. Rosenheim thought the condition due to primary atony of the muscular coats of the esophagus. Kraus maintained that the condition was due to long continued spasm of the cardia associated with a paralysis of the circular fibers of the esophagus, which in turn were due to degenerative changes in the vagi. Martin considered acute esophagitis an important factor. Zenker, Fleiner and others maintained that dilatation resulted from a congenital predisposition on the part of the esophagus. Kinking at the

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hiatus esophagi has been advanced as a factor. Hertz believes the condition is due to a lack of normal relaxation of the cardia, for if it were due to spasm one would find more hypertrophy of the cardia than is demonstrated on examination. Plummer, in his study of forty cases reported in 1908, definitely proved that the spasm precedes the dilatation and that primary atony is relatively a rare condition. This conclusion, he states, is further born out by the evidence of muscular hypertrophy. Smithies states that "it is quite likely, that such lesions as give rise to repeated spasms at the cardia are capable of producing muscular hypertrophy of an overactive and over-worked sphincter, and at the same time this alteration in sphincter reflex secondarily disturbs the neuro-muscular mechanism of the esophagus above it." Jackson believes that so-called "cardiospasm" is in reality, in almost all instances, a hiatal esophagism or phrenospasm. At first this opinion was based on endoscopic clinical observation. An anatomical basis for this view has been furnished by Leibult and Rouget, working independently of each other. They have demonstrated muscular fibers, leaving each crus at the level of the hiatus, which pass to the esophagus and with whose fibers they are interlaced, terminating on the anterior aspect. These fibers exist only on the subdiaphragmatic portion of the esophagus and interlace with those of the opposite side. Jackson would abolish the old term of cardiospasm and substitute therefore the clinical types of spasm that may be found. These are namely, hiatal, abdominal and cardial esophagisms.

It is interesting to note that clinically we only see chronic spasm at the upper or lower end of the esophagus. At the upper end, the inferior constrictor of the pharynx spreads out on the lateral and anterior surfaces of the esophagus. At the lower end, the esophagus passes through the diaphragm, surrounded on either side by the cruri which are believed by Leibult and Rouget to give off fibers which surround and interlace with those of the esophagus. If spasm is due entirely to the contraction of the esophageal musculature one would think that chronic spasm would occur at any point along the esophagus. This, in my experience, has not been true. My observations, based on endoscopic studies, confirm the view held by Jackson in regard to the

following: Chronic spasm occurs either at the upper or lower end of the esophagus, occasionally occurring at both ends of the esophagus; the spasm occurring at the upper end of the esophagus is, in fact, a spasm of the inferior constrictor of the pharynx; the spasm at the lower end of the esophagus is primarily a spasm of the hiatal esophagus; abdominal and cardial esophagisms occur only in association with hiatal esophagisms.

The only difficulty experienced in passing the esophagoscope occurs at the hiatus esophagi. Once this point is passed the instrument passes through the abdominal esophagus and cardia without difficulty. Furthermore, the esophagoscope can usually be passed into the stomach in all cases except those in which there is an "S" shaped esophagus with marked kinking.

It is not my desire to go into a detailed discussion of the act of swallowing, as it is well known that the greater part of the act of swallowing is due to a complicated reflex. It is only the beginning of the swallowing act that is under voluntary control. Once the bolus of food is started down the esophagus, its further progress is due to reflex peristalsis. Each portion of the esophagus is dilated as the bolus of food enters, which in turn stimulates a peristaltic contraction wave which carries the food down the esophagus and into the stomach. Granting that spasmodic stenosis is a pathological disturbance of a normal reflex, it becomes very interesting to study the causes which may be the disturbing factors. In some cases it seems possible that careless, rapid eating or the gulping of food is sufficient to produce the initial spasm, as many patients state that the first abnormal sensation, referred to the region of the esophagus, occurred while hurriedly taking food. Clinically, we know that spasmodic stenosis may occur in any local disease of the esophagus or be associated with diseases that are quite remote from the esophagus. From endoscopic studies, it has been demonstrated that severe spasm of the esophagus may occur occasionally, associated with superficial lesions of the mucous membrane. Jackson states that this is probably due to the fact that the esophageal pain-sense is less efficient than the esophageal tactile sense. However, it is well established that the esophagus is quite insensitive below the cricoid level.

Foreign bodies lodged in the esophagus and non-malignant organic strictures are patent factors in producing spasmodic stenosis. On the other hand, rarely do we see any marked degree of spasm associated with carcinoma. This lack of spasm is due to the cancerous infiltration of the deeper tissues of the esophagus which prevents contraction of the circular fibers. In some cases, diseases of any of the abdominal viscera may give rise to spasmodic stenosis of the esophagus without any local cause being found in the esophagus itself. Thus, the reflex stimulus may arise from the stomach, duodenum, gallbladder, appendix or other abdominal viscera. In other cases the exciting factor may be found in some form of focal infection, such as infected teeth, tonsils or sinuses. Still, in other cases, the initial spasm would appear to be due to some emotional or psychic condition. However, it must be borne in mind that spasmodic stenosis frequently can not be explained on this basis.

When spasmodic stenosis occurs not associated with local disease of the esophagus, it practically always occurs at the upper or lower end of the tube. May this not in a measure be explained by the difference in anatomical structure of the esophagus at these points? In the normal individual, there is a hesitation in the swallowing act when the food reaches the hiatal esophagus. In spasmodic disease of the lower end of the esophagus this is prolonged. Thus, primarily the spasm may be considered a pathological prolongation of a normal reflex.

There is some difference of opinion as to whether or not hypertrophy of the lower end of the esophagus occurs in spasmodic stenosis. In my cases which have been operated upon or have come to autopsy, no hypertrophy could be demonstrated. Granting that marked hypertrophy is the rule, it is rather difficult to understand the relief from symptoms that occurs when the spasm is dilated with only a pressure of 50 to 150 millimeters of mercury and it is just as difficult to understand a cardiac sphincter hypertrophied sufficiently to withstand a pressure of 500 to 650 millimeters of mercury without rupture when, under normal conditions, there is no increase of circular fibers at the cardia. In my opinion, the greater portion of the pressure is borne by the cruri of the diaphragm.

In the beginning of the disease, the symptoms

are usually intermittent in character. They may be mild or very severe. In spasm of the upper end of the esophagus the most characteristic symptom is difficulty in swallowing, which is due to inability to start the food downward. Once the start is made, the food passes through the esophagus into the stomach without further difficulty. In mild spasms of the lower end of the esophagus there occurs muscular hypertrophy of the esophageal wall, which is later followed by atony and dilatation. If the spasm is severe, there is little hypertrophy but rapid dilatation. The initial spasm is usually ushered in while the patient is hurriedly taking food. There is seldom severe pain but these patients complain of a fullness or pressure beneath the lower end of the sternum. Sometimes the sensation is felt in the upper part or the middle of the chest. They feel as if the food sticks and they realize that it will not go down. It feels as if the passage is closed and the food fills up the chest. This sensation of fullness increases in *pari passu* with the dilatation of the esophagus. Salivation is a frequent symptom. Frequently the patient voluntarily relieves the discomfort in a few minutes after finishing a meal by bringing up the greater part of what he has eaten, mixed with mucus and saliva. This generally can be done quite easily but occasionally it is necessary to produce a vomiting reflex by tickling the throat. It is uncommon for the food to be returned quite involuntarily but this may occur if a large quantity has been retained in a greatly dilated esophagus sufficiently long for a certain amount of bacterial decomposition to occur. In these cases, the esophagus becomes very much irritated which causes its contents to be rejected. The vomiting or regurgitation in these cases is very characteristic. It is usually sudden, without nausea, propulsive in character and frequently occurs during the meal or just after the patient has finished taking food. Occasionally, it is definitely delayed and the vomiting occurs in the early morning when no food has been taken since the evening before. Rarely, food may be vomited that has been eaten twenty-four hours previously. The vomitus consists of the food eaten, mixed with a large amount of mucus and saliva. It is alkaline in reaction and, in the long standing cases with marked dilatation, shows a high bacterial count.

Semi-solid foods are usually less difficult to swallow than either liquids or solids. All are retained better if swallowed extremely slowly. In the dilatation of the esophagus due to spasm the weight of the food after a meal forces the more liquid portion slowly into the stomach. Gravity is also a factor in these cases. Some patients have learned to add to the weight and bulk of the food by drinking one or more glasses of water. They follow this by voluntary acts of swallowing which definitely increases the pressure in the esophagus and this consequently forces more food into the stomach. When the weight of the column of food falls below a certain point in the individual case or the patient lies down, the pressure becomes insufficient and the flow ceases. Consequently, in many cases the esophagus continually contains food. The horizontal position of the body during sleep lessens the pressure in the esophagus and permits the esophageal contents to flow back into the pharynx. When this occurs, some of the food or secretion frequently finds its way into the trachea and these patients are awakened with severe paroxysm of coughing and sometimes with symptoms of strangulation. The general health at first is not impaired. This is in complete contrast to malignant disease of the esophagus and in spite of the fact that these patients may lose considerable weight. In many cases of mild degree the general appearance of the patient remains good for many years but in the more severe types of the disease the atony and dilatation increases until the patient's nutrition is markedly impaired. Then we have added to the symptoms already mentioned those due to inanition.

In spasmodic disease of the upper end of the esophagus, the clinical history aids materially in the diagnosis but a positive diagnosis can only be made by an endoscopic study. In no other way is it possible to differentiate between spasmodic stenosis and that due to organic disease. The endoscopic appearances of spasm will be discussed later. When the disease occurs at the lower end of the esophagus and is well established, the patient's description of his symptoms is generally so characteristic that a diagnosis of spasm with dilatation of the esophagus may frequently be made from the clinical history with a considerable degree of probability. In the early cases, however, the history is not so charac-

teristic and points only to some form of obstruction, the character of which must be determined by further study.

The following special methods of examination are helpful in all cases: first, the sounding of the esophagus with an ordinary stomach tube or an olive bougie; second an x-ray study; third, an endoscopic examination. In these cases, when a stomach tube is introduced into the esophagus it passes freely until the hiatal esophagus is reached—here its further progress is stopped, due to the spasmodic contraction of the esophagus at this point. If there is much dilatation of the esophagus the tube frequently curls on itself and gives one the impression that it has entered the stomach. In the cases with marked dilatation, the manipulation of the tube usually causes free regurgitation of esophageal contents. In the early cases, with very little dilatation, the stomach tube occasionally may be passed into the stomach. If, after failing to pass a stomach tube, one is successful in passing a large olive bougie using a silk thread as a guide, it should suggest at once that the lesion is a spasmodic and not an organic stenosis. The sounding of the esophagus with the unguided olive bougie is not free from danger and should not be done. This is especially true in the cases with marked dilatation. In these cases it not infrequently happens that there is some pouching of the lower end of the esophagus to the right and above the diaphragm. The unguided bougie is more likely to enter this pouch than the hiatal esophagus and, if any degree of force is used in its manipulation, puncture of the esophagus may occur. In sounding the esophagus in spasmodic stenosis of the lower end, one is impressed with the wide variation in the amount of resistance encountered but at all times some resistance is apparent.

The roentgen examination in spasmodic stenosis of the lower end of the esophagus usually establishes the diagnosis. However, in early cases with very little dilatation of the esophagus one should not depend too much on this method. These are the cases in which a careful endoscopic examination is most helpful. Early in the disease it is most important that the examination be made during the attack. In the early stage the contrast between the apparently normal esophagus seen with x-ray when an examination

is made in the interval *between* the attacks and that seen *during* the attack is characteristic of spasmodic disease, as very little variation occurs in organic stenosis. The esophagus should be thoroughly washed out before the barium mixture is given, otherwise it will frequently be found partially filled with food and secretion which may cause irregularity in outline that is difficult to differentiate from organic disease. In the examination, one should make both a fluoroscopic and radiographic study with the patient in the anterior-posterior and oblique positions. These two positions bring out details that otherwise might be overlooked. In the typical case one finds a blunt or conical obstruction at the hiatus esophagi with a secondary dilatation of the esophagus. The dilatation is uniform and as a rule there is no irregularity in outline. In long standing cases there may be lengthening of the esophagus as well as dilatation with pouching of the lower end—the so-called “S” shaped esophagus. In some of these cases the capacity of the esophagus may be a thousand cubic centimeters or more. In the cases with moderate dilatation the barium meal passes into the stomach in a comparatively short time but when marked dilatation is present the barium ceases to flow into the stomach when the intra-esophageal pressure falls below a certain point in the individual case. If the patient does not vomit, barium may be found in the esophagus twenty-four hours after the examination. Two conditions confuse the diagnosis. They are carcinoma and cicatricial stenosis. In neither one are you likely to find the lesion limited to the hiatus esophagi. They both, as a rule, cause irregularity in outline which extends along the esophagus above the diaphragmatic opening. However, it must not be forgotten that a regular contour is sometimes found in carcinoma and also that irregularities occur in spasm.

Esophagoscopy adds much to our knowledge in spasmodic disease of the esophagus. I believe that, in spasm of the upper end and early in spasm of the lower end, it offers more than any other method of study. By other methods it is very difficult to make a differential diagnosis between spasmodic and organic stenosis of the upper end of the esophagus. An endoscopic study permits direct inspection of the diseased area which usually establishes the diagnosis.

Also, early in obstructive lesions of the lower end of the esophagus, direct endoscopic examination gives valuable information as to whether or not the obstruction is due to spasm or organic disease. By this method one can actually see the spasmodic closure and carefully examine the mucosal surface for an abrasion, ulceration or other evidence of organic disease. Esophagoscopy, if carefully done, is not dangerous and causes the patient very little discomfort. A local anesthetic applied to the pharynx and upper end of the esophagus is all that is necessary in many cases as the esophagus is insensitive below the cricoid level. Most of the cases with marked dilatation do not even require a local anesthetic.

Some cases of spasmodic stenosis occurring at the upper end of the esophagus cannot be endoscopically differentiated from the spasm that always occurs upon introducing the esophagoscope. In other instances, the mucosa is apparently thrown into folds which radiate from a central point and in a few cases the entrance into the esophagus appears as a transverse or crescent-like slit. The mucous membrane is normal in appearance.

By far the most important endoscopic finding is that, when slight pressure is made with the esophagoscope, the spasm relaxes and no further difficulty is experienced in passing the instrument through the esophagus.

In cases of spasmodic stenosis occurring at the lower end of the esophagus no difficulty is experienced in introducing the esophagoscope until it reaches the hiatus esophagi. There it meets definite resistance, but with gentle pressure the spasm relaxes and the esophagoscope passes into the stomach. Early in the disease the endoscopic appearance of the esophagus may not differ from the normal. Late in the disease the esophagus is very much dilated, the walls are atonic, the mucosal folds obliterated, the respiratory movements absent, the mucous membrane is of grayish color, showing evidence of chronic inflammation and, in many cases, superficial ulcerations.

The treatment of spasmodic stenosis of the esophagus is determined by several factors, namely: the location of the spasm, the stage of the disease and the appearance of the esophagus on examination. In the cases that come under

observation early in the disease one may expect good results from treatment, while in those cases that come under observation when the disease is far advanced one finds the results less satisfactory. It is obvious that the exciting cause, if found, should be removed. In many cases, the spasm ceases and the symptoms disappear without further treatment. These patients are frequently undernourished, due to dysphagia. Therefore, the diet should be one of high caloric value from which all highly seasoned, coarse and irritating foods have been removed. These patients should be advised to eat their meals very slowly. This especially applies to the cases seen early in the disease as, not infrequently, the history suggests that the initial spasm may have been caused by the rapid gulping of food. In the cases in which there is marked dilatation of the esophagus soft or semi-solid food should be given the preference, as it usually causes less dysphagia. If possible, the esophagus should be lavaged at night in all cases in which food and secretion are found to be present continuously. By doing this many of the annoying symptoms occurring during sleep and due to the presence of food in the esophagus, are relieved. Also by removing the contents of the esophagus the intra-esophageal pressure is lessened and this may aid the musculature in regaining some of its lost tone.

Medicinal treatment, while limited to a few drugs, is helpful in many cases. Belladonna, given in increasing dosage until one reaches the physiological tolerance of the drug, is valuable in most of the early cases and in some of the late ones. Bromides are useful in the definitely neurotic patient. Mineral Oil, by protecting the mucosa, allays irritation and is especially useful when the spasm is associated with a local lesion of the mucosa.

When the spasm is well established or is associated with marked dilatation of the esophagus some form of mechanical stretching of the spasmodic area is necessary before one may expect to relieve or cure the disease. Spasmodic stenosis occurring at the upper end of the esophagus is very much easier to treat than that occurring at the lower end. The former is usually relieved by the introduction of the large-sized esophagoscope. In the severe cases from four to six treatments may be required. The passage of a large-

sized esophageal bougie will accomplish the same result. In spasmodic disease of the lower end of the esophagus the passage of the large esophagoscope or large bougies does not cause enough dilatation to overcome the spasm and in these cases it is necessary to use some other means of dilatation. The methods most frequently employed are divulsion with a specially constructed steel divulsor or dilatation with a hydrostatic or pneumatic bag.

Russell's work, followed by that of Lerche, Sippey and Plummer demonstrated that spasmodic stenosis of the lower end of the esophagus could be treated successfully by dilatation with a specially constructed hydrostatic dilator introduced through the esophagus. In our work, for a number of years, we used the water distended dilator devised by Plummer. For some time we have been dilating the spasm under fluoroscopic control, using the Plummer instrument but substituting air inflation for water distention. The advantage of the air distended apparatus is that it lends itself to x-ray visualization as a means of control—an aid we believe is most helpful. In order to better visualize the apparatus we have a thick barium paste applied to the outer surface of the silk bag. This has added much to our fluoroscopic image. The x-ray shows that in some cases it is difficult to place the instrument properly and that in these cases the tendency is for the instrument to either slip upward or, more frequently, downward at the moment of distention.

In some cases we have found that the easiest way to place the bag is to pass it beyond the spasm, slightly inflate, and then withdraw it until properly placed and, while holding it in position, proceed with the inflation. The x-ray also shows that the usual dilator is of greater diameter than is necessary—the spasmodic area never being stretched to the full extent of the dilator.

The method of treatment is as follows: The instrument is introduced by using a silk thread as a guide. The patient is placed before the fluoroscope and the exact placing of the bag done under fluoroscopic control. Inflation is begun. The manner and rapidity with which dilatation occurs is carefully noted. At short intervals a reading of the manometer is taken. The degree of dilatation is also carefully noted

and usually not continued beyond 4 to 5 centimeters in diameter. If pain occurs, the pressure is promptly released. At each treatment the distended bag is left in position from five to ten minutes. The number of treatments have varied in the mild cases from two to three, with a pressure of 100 to 200 millimeters of mercury. In the more severe ones it has been necessary to give from six to ten treatments, with a pressure varying from 200 to 450 millimeters of mercury.

The first few treatments are repeated every fourth day. If more treatments are required, the time between the same is lengthened to a week or even two weeks. The last few treatments are given at monthly intervals. The patient should not be discharged until the esophagus is found to be free from food.

The method of forceful divulsion with an inflexible steel instrument has never appealed to me. Each treatment requires a general anesthetic and the placing of the divulsor endoscopically. Both of these requirements increase the risk to the patient.

The result of these studies are based on the observation and treatment of fifty cases. In the cases of spasm of the upper end of the esophagus the diagnosis was confirmed by an endoscopic study, while in the cases of spasm of the lower end of the esophagus the diagnosis was confirmed by both an x-ray and esophagoscopic examination.

The relief from symptoms usually occurred very promptly. Not infrequently the patient was able to eat an ordinary meal after the first satisfactory dilatation. The gain in weight and strength was rapid. The cases of spasm of the upper end have been relieved completely, while the results in spasm of the lower end depended mostly on the degree of associated dilatation. The early cases with a moderate degree of dilatation were relieved completely. The late cases, with enormous dilatation, were markedly improved. How much the esophagus regained its muscular tone depended on the degree of dilatation. In the early cases with moderate dilatation the esophagus apparently regained most of its lost tone but in the cases with enormous dilatation no change in the size of the esophagus was noted. No cases of marked lengthening of the esophagus with pouching to the right and above the diaphragm—the so-called "S" shaped

esophagus—occurred in this series. The dilatation of the lower end of the esophagus were made by using either a water distended or an air inflated apparatus. From our studies, we believe that the apparatus may be more accurately placed and the degree of dilatation more carefully observed if the dilatations are made with an air inflated apparatus under fluoroscopic control.

DISCUSSION

DR. P. P. VINSON, Rochester: I want to discuss just three points in the diagnosis of cardiospasm. First, the condition is not seen necessarily in neurotic persons; the majority of our cases have not been more neurotic than the general run of patients. Second, a diagnosis cannot be made from the roentgenographic evidence, for the reason that cases of obscure carcinoma of the cardia may simulate absolutely the findings of cardiospasm. There may be diffuse dilatation of the esophagus such as is seen in the moderate dilatations due to cardiospasm, and only by passing an olive bougie through the cardia can this lesion be eliminated. The history is of much value but is not conclusive. The symptoms may be of long duration. Even with two or three years of carcinoma at the cardia there may be a perfectly smooth cigar-tip type of cardia with no filling defect, and expert roentgenologists cannot distinguish this condition from cardiospasm. Third, we should all be on the lookout for cardiospasm in patients who complain of epigastric pain.

In a recent review of 300 cases of cardiospasm at the Mayo Clinic we found that 142 patients complained of epigastric pain. Of this number fifty-two had pain as the initial symptom with or without dysphagia, and one patient had attacks of pain extending over a period of fourteen years before dysphagia began.

We see quite a large number of cases of cardiospasm with epigastric pain that simulate gall bladder disease, or they may simulate coronary sclerosis with *agita pectoris*. These three conditions are at times certainly very difficult to differentiate. Seventy-seven of the 142 patients gave pain as one of the chief symptoms. The pain may be mild, or it may be severe. We have had a number of cases of cardiospasm with only slight lagging of the indigested meal at the cardia, in which there were repeated attacks of epigastric pain simulating gall bladder colic, occurring however more frequently, probably three or four times a day without jaundice, without soreness, and without definite radiation. These cases have been frequently diagnosed as gall bladder disease, but the patients have been relieved absolutely of their symptoms by dilatation of the cardia.

I am inclined to class spasms high in the esophagus among the hysterical dysphagias in which the patients are relieved regardless of the size of the olive passed into the esophagus. Cardiospasm is relieved

only by wide dilatation of the cardia, and it is our experience contrary to that of Dr. Freeman, that this stretching is more effectual in the long standing cases, than in cases in which the history is short and the dilatation of the esophagus is slight. In the early cases the dilatation must not be carried so far as in the more advanced cases, and the results are not so good. We usually dilate once. I believe our statistics will show about 65 or 70 per cent cures with one dilatation.

DR. ROBERT RIZER, Minneapolis: I was not fortunate enough to hear all of Dr. Freeman's paper as I came in a little late. However, I got an idea of what he said from the remarks made by Dr. Vinson.

I think one of the most important factors is diagnosis, and I feel strongly that the diagnosis cannot be made on the x-ray findings alone, as pointed out by Dr. Vinson. I think the endoscopic examination is another most important factor, particularly early in the diagnostic period. In many instances it will not be possible to get down into the esophagus. In the experience of so many men where there is a good deal of sacculatation at the base of the esophagus, passing a string and going down over the string with the esophagoscope, or passing a tube is difficult. A soft esophageal bougie should not be used as one cannot tell from the early symptoms the degree of inflammation which may be present. Rupture of the esophagus is easily produced, and unless great care is used early a soft rubber tube should be used in the dilatations.

I agree with Dr. Vinson that quite a percentage of cures have been obtained in the early and later stages where there is a great deal of sacculatation. Dilatation may be necessary in a number of cases because of the amount of inflammation present and the reflex spasm.

Another thing which should be done in regard to irritating fluid is the elimination of cold. A drink of cold water will produce cardiospasm. If one wants to demonstrate cardiospasm, the only thing to do is to give the patient a drink of cold water, putting in some methylene blue or some other colored solution into the stomach, and then have the patient drink the water and later withdrawing the colored solution.

I think great care should be used in dilating. The manometer should be used. We have used a high pressure machine with a screen, the type that contains a small olive at the end, so that if it is necessary to go over the string it can be done with ease. To that extent there is no danger.

It has been shown experimentally and in human beings that where rupture has occurred, naturally it carries a high mortality.

I was much pleased with Dr. Vinson's report of cases. His experience is practically identical with the experience we have had and the cases we have reviewed.

DR. FRANK SMITHIES, Chicago, Illinois: It is a very interesting fact that the average textbook merely mentions the type of ailment which is under consideration, although cardiospasm with diffuse dilata-

tion of the esophagus is a most distressing cause of chronic dysphagia. Cardiospasm with diffuse dilatation of the esophagus is of more frequent incidence than is cancer of the esophagus; it is more frequent than is stenosis in the esophagus as the result of peptic ulcer, and its manifestations are quite as annoying, quite as distressing to an individual as are any of the diseases mentioned.

I dislike very much the term "spasmodic stenosis" of the esophagus. It seems to imply that we are dealing with a temporary thing, with something which is exclusively in the nature of a neurosis or a reflex. I may have been rather unfortunate in my experience, but certainly I see very few of these cases of "spasmodic stenosis" of the esophagus which are so early as to be but temporary, transient or which are not accompanied by definite alterations of an anatomic nature in the esophagus itself.

The cases which come under my observation of pure "spasmodic stenosis" of the esophagus are regarded as roughly due to local inflammation, or perhaps to a hysteroid condition, (as has been mentioned) they are not sufficiently serious to warrant much concern. On the other hand, the cases which come to us in the group of so-called "cardiospasm" are individuals usually who are seriously ill, who are starving to death, and who do die undoubtedly unless they are adequately relieved. I am of the opinion that a considerable number of the deaths from "cancer of the esophagus", as given in the death certificates,—instances where no autopsy has been held—are not deaths from cancer of the esophagus, but are examples of starvation from intractable and untreated cardiospasm.

The term "cardiospasm" is itself an unfortunate one. We prefer to employ the term "Meltzer's syndrome," because Meltzer really described this condition many years ago, this syndrome includes not only a definite anatomic change at the cardia and in the lower esophagus, but a change very likely in the entire extent of the esophagus possibly of a neuromuscular nature.

This is not a malfunction which is relieved by bromids, by benzol benzoate, or by frequently washing out the esophagus; it requires active treatment. If the condition is recognized, and unfortunately it is not usually recognized in general practice, the treatment is simple, reasonably safe and highly satisfactory. In fact, the treatment is more satisfactory than with any other form of chronic esophageal stenosis with which I am familiar, perhaps excepting syphilis.

The lesions as they come to us are definitely obstructive. I see very few instances of true cardiospasm where I can pass a stomach tube or an esophagoscope or anything of that kind into the stomach even when such are guided by silk cord or wire. The cases as they come to me have had an average esophageal permanent retention of more than 200 c. c. In one instance, we had 2800 c. c. retained in the esophagus for a number of months, the right lower border

of the esophageal sac being four inches below the cardia. Such cases demand treatment for an anatomic defect. Certainly, we owe a debt of gratitude to Dr. H. Plummer of Rochester, Minn., for calling our attention to this condition years ago and suggesting a most admirable form of treatment. We have used Plummer's method of treatment in a considerable number of cases, certainly in enough to warrant an opinion, and we find there is nothing superior to it, provided it is properly employed and controlled.

We have not found that cardiospasm patients are pain-free. With respect prognosis as has been mentioned by Dr. Vinson, most of them are benefited. When treating them we rather like to have them experience a bit of pain by the instrumentation rather than the thing being easily borne; pain supplies a rough gauge of the degree of dilatation. There is, however, a mortality of about 3 per cent from treatment, taking cases as they come, in a considerable series. It is sometimes difficult to say whether or not one has ruptured the esophagus. We have one instance where a bougie had been passed at another institution for many months, and because the tip of the olive passed more than four inches deeper than it should go in the normal esophagus it was presumed by the operator that the tip had gone into the stomach. I was the one unfortunately who dilated this patient later, by hydrostatic divulsion. He experienced a sudden collapse about one hour after the dilatation upon the drinking of cold water. My assistant suggested that we might be dealing with an instance of spontaneous pneumothorax from an old tuberculosis, but I was not convinced. I punctured the pleural sac on one side, and recovered some muddy colored fluid. I then had the patient take a small capsule of carmine (gr. iii) and in a few minutes punctured the pleural sac again, and recovered red stained fluid. That convinced me we did not have a spontaneous pneumothorax; at autopsy it was shown that we had split the lower end of the esophagus through the cardia upwards.

Dr. Freeman mentioned that in his experience, patients do not have hypertrophy at the cardiac sphincter. I think that this has been stated before by others. However, in my experience at autopsy, and we have had several, there has been a definite hypertrophy not only of the sphincter but in the lower end of the esophagus in the cases where the dilatation of the lower esophagus has not produced marked attenuation of the muscle bundles. I think the only reason that we can get successful results in the treatment of late cases is because we have a definitely hypertrophied sphincter to divulse.

With other points which have been brought up in the discussion and in Dr. Freeman's paper I heartily agree. Certainly, the roentgen ray does not always tell the story; but it gives more than a hint. The roentgen examination should be carried on as routine, however. Endoscopic examination is also faulty. I think it is the experience of all of us that if we have a patient with marked dysphagia, with uniform dif-

fuse dilatation of the esophagus in which upon dilatation the esophageal contour is preserved, in an individual who is markedly starved, but not toxic, has no gross malignant disease, and who gives a negative Wassermann, we are likely to be dealing with a true cardiospasm, and we should proceed with treatment along such lines even though the etiologic factor may be unknown.

Just one word with regard to exciting causes with respect to after-treatment. I think many of these cases are primarily instituted by some intraabdominal focus of disease—a high lying peptic ulcer, an old appendix, or an old gallbladder. If one expects to secure permanency of cure following mechanical local esophageal treatment, he must see that this intraabdominal pathology is removed before the patient leaves his care.

DR. FREEMAN (closing the discussion): There were a few points brought up in the discussion about which I would like to say a word or two.

Pain has not been a prominent symptom in the cases we have studied. In only five cases was it severe and in these it was referred to the epigastric region.

The results of treatment, in our experience, have not been entirely satisfactory in the late cases. While most of these cases have been symptomatically relieved, the esophagus has remained dilated. This is in contrast to the cases with moderate dilatation where, as far as we were able to judge, the esophagus regained most of its lost muscular tone.

Hypertrophy of the lower end of the esophagus was not found in the cases that came to operation or at autopsy. About the time that Dr. Plummer reported forty cases treated successfully with hydrostatic dilatation, I saw three cases with Dr. Bloodgood. The abdomen was opened in each case; no pathology was found. The lower end of the esophagus was thoroughly dilated after doing a gastrotomy. These patients were completely cured. Two patients with carcinoma in the pyloric region of the stomach had an associated spasm of the lower end of the esophagus. When the stomach was opened, the lower esophagus was found to be normal. In the case that came to autopsy, the patient had apparently had a carcinoma which had developed in an ulcer in the pre-pyloric region. This patient had had symptoms of cardiospasm for ten years. The esophagus was markedly dilated. The autopsy failed to reveal any gross or microscopic evidence of hypertrophy of the lower end of the esophagus.

The diagnosis, in my judgment, cannot be made in many cases from an x-ray examination alone. In addition, I believe all cases of dysphagia, mild or severe, call for a careful endoscopic study and sounding of the esophagus with an olive tipped bougie passed over a silk thread as a guide. I am quite sure that an endoscopic examination will occasionally reveal a superficial ulceration or an abrasion as the exciting factor in the production of spasm which would not be revealed by an x-ray study.

I thoroughly agree with those who discussed the paper that neurosis is not an important factor in the condition.

SALIGENIN, A NEW NON-TOXIC LOCAL
ANESTHETIC AND ITS MERCURY
DERIVATIVE, A NEW AN-
TISEPTIC.* **

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Old time medicine suffered a great deal from the use of too many drugs. The generation that is passing has suffered, though less, from therapeutic nihilism, and the generation that is to come must have more drugs of less toxicity but better suited to the needs for which they are used, drugs which hit their target hard but leave the other tissues uninjured. The alkaloids which occur in nature all have big molecules in which useful, useless and toxic chemical groups are intermingled with useful ones. In order to attain greater chemical simplicity and lower toxicity we must resort to chemical synthesis of substances whose molecules will contain the physiologically active groups in the very highest degree, but which are stripped of all the necessary groupings that might add to their toxicity.

At the last meeting of the society I reported the results of some clinical and experimental studies upon benzyl alcohol and some allied compounds, as well as upon benzyl benzoate. At that time we had investigated not only benzyl alcohol which Macht had shown to possess properties as a local anesthetic, but also a considerable number of chemically similar phenyl alcohols, phenyl ethyl alcohol, cinnamic alcohol, piperonyl alcohol, saligenin, hemosaligenin, ethyl saligenin, and methyl saligenin, and had found that of this series saligenin was the best.

Saligenin is the alcohol corresponding to salicylic acid and is oxidized to salicylic acid in the body. It is formed in nature by the splitting up of the glucoside salicin by the enzyme emulsion and it can be prepared synthetically in vari-

ous ways. We found that saligenin is distinctly less irritant to the tissues than benzyl alcohol and that it is much more certain in its action, or ordinary purposes of inflation anesthesia a two per cent solution is satisfactory. It is water soluble up to ten per cent and is from five to ten times less toxic than procaine and from twenty-five to fifty times less toxic than cocaine. Judging from results on the dog and cat (0.4 to 0.7 G per kilo) a man could tolerate up to one or two ounces of the solid drug or 1500 to 3000 mls of a two per cent solution intravenously—or about a gallon subcutaneously.

We have now had a considerable number of minor operations done under two per cent saligenin, in which the anesthesia has been perfect. Whenever possible we have aimed to have the conditions perfectly controlled by injection of saligenin on one side and of procaine or cocaine on the other. Thus, in the removal of small tumors of the neck, Dr. Jos. Stratte, anesthetized one side of the tumor with saligenin and the other side with procaine and the patient found no difference in the anesthesia upon the two sides.

Similar experiences were reported in such operations as the excision of the matrix of the nail of the big toe for the relief of bunyons, and also in a considerable number of tonsillectomies done by Drs. Clark, Camp, Beaudoux and Kenneth Phelps using saligenin on one side and procaine or cocaine on the other. In none of these could any difference be noted between the side done under saligenin and the other side except that whatever the anesthetic the side with the most adhesions was always the most uncomfortable. It must be stated however, that in two series of tonsillectomies in which Dr. Phelps used saligenin on one side and apothesine on the other, the patients generally felt less discomfort in the apothesine side than on the saligenin side. This seems rather anomalous, and I have no explanation for it as apothesine is not usually regarded as a particularly superior anesthetic, and yet it must be reported along with the rest.

Apothesine is, however, more than five times as toxic as saligenin, and unpleasant reactions after its use are not infrequent. Thus far we have had no unpleasant reactions after the use of saligenin chemically.

Dr. Martin B. Tinker of Ithaca has used it in

*Read before the Southern Minnesota Medical Association, Mankato, November, 1920.

**The researches reported in this investigation were made possible with the aid of funds granted by the United States Inter-departmental Social Hygiene Board for the discovery of more efficient medical measures in the prevention and treatment of venereal diseases.

a case of herniotomy and in some minor surgery with good results, and Dr. Farr has done two thyroidectomies, one operation for the relief of intestinal obstruction and one gastrostomy using large quantities of two per cent saligenin with perfect anesthetics.

At present we are studying the effect of intraspinal anesthesia in cats. In the animals thus far used we have found that the introduction of two mls of two per cent saligenin does not affect the respiration and is safe, while a like amount of one per cent procaine sometimes stops the respiration. The two per cent saligenin in cats gives evidence of complete anesthesia lasting from fifteen to twenty minutes, while one per cent procaine, though more dangerous, lasts about twice as long. It is most likely that in man, owing to the better upright position, stronger solutions and much more prolonged anesthesia can be maintained.

Quite gratifying have been the results which we have obtained with anesthesia in the urethra. On account of the danger from toxicity of cocaine and the scarcity and danger of alpin, the introduction of a non-toxic anesthetic for the urethra is particularly desirable. Dr. Wynne has used a four per cent solution of saligenin applied to the meatus and introduced into the urethra for the cystoscopy of women with particularly tender urethras and in twenty-six cases found the anesthesia perfectly satisfactory.

In some of these women ten per cent cocaine had been used previously and yet they pronounced the saligenin anesthesia as satisfactory as that obtained with cocaine.

We are also experimenting with saligenin as a urethral anesthetic in the male and have not as yet reached definite conclusions. The analgesia obtained seems to be as good as that obtained with cocaine. In a number of cases, however, in which Dr. Thomas has used the Braasch direct cystoscope the patients have had unpleasant erections, apparently more frequent than those following the use of cocaine. This is probably the result of vasodilation. Dr. Cramer and Dr. Wethal however, using the ordinary indirect cystoscope in which there is much less pressure exerted on the prostate and posterior urethra, have not produced any erections, and

in their hands the anesthesia has this far been satisfactory*.

Saligenin also anesthetizes some other mucous membranes, especially the conjunctiva but we have not yet had any clinical tests of its use in this connection. Upon the intact mucous membranes of the mouth less strong solutions do not seem to produce complete anesthesia, but Dr. Wittich has used it successfully to still the pain of a painful ulcer of the tongue, and it probably can be used for many similar purposes. Dr. Meland has also stopped the itching in a case of very stubborn pruritus ani by the use of saligenin in a ten per cent ointment; and Dr. W. R. Shannon has stopped the itching of one case of eczema and the pain of one large bunion with a 5 per cent ointment.

In the blocking of the mandibular nerve Dr. Charles Schien has found that a four per cent solution was too weak, but that six per cent solutions gave a nerve block lasting about half an hour. This subject is at present under further investigation.

Upon studying the antiseptic effect of saligenin and its homologues we found that they were all very mild antiseptics so that a one or two per cent solution required from half to one hour to kill the ordinary germs. Our chemist Mr. Merrill C. Hart has therefore prepared a mercury derivation of saligenin by boiling it with mercuric acid, and has obtained a nice crystalline compound containing two atoms of mercury to the molecule with the formula $\text{Hg}_2\text{O}:\text{CH}_2\text{OH}::\text{HG}:\text{OH}$.

This compound forms a water soluble sodium salt which is quite stable in distilled water but is precipitated by tap water.

It is not a dye and therefore patients who use it do not reveal the fact upon their underwear. It is about as strong an antiseptic as bichloride of mercury. In other words a 1:10,000 solution of the sodium salt in bouillon kills bacillus coli, staphylococcus albus and the gonococcus in 5 minutes and kills the streptococcus hemolyticus in 10 minutes; while in beef serum bouillon a 1:500 solution kills these germs in 5 minutes. On the other hand, it is much less irritating for the mucous membranes, so that patients can hold a 1:1000 solution in the urethra for five

*Later results in twenty-eight cases using 8 per cent saligenin have been satisfactory.

minutes without burning or stinging or any subsequent signs of irritation.

Other similar mercury compounds such as the acetate of mercury saligenin and the mercury compound of parahydroxymetanitrophenylcarbinol have about the same antiseptic power and do not seem to possess any advantages over the mercury saligenin.

We have therefore been using mercury saligenin in the Night Clinic for venereal diseases of the University of Minnesota for the treatment of gonorrheal urethritis. We have thus far confined ourselves to the treatment of anterior urethritis since this presents an uncomplicated problem in which the drug can reach the focus of infection and the results of treatment can be accurately followed.

In the uncomplicated cases of anterior urethritis which has been treated at the night dispensary during the past year the average duration has been ninety days and about thirty per cent have developed posterior urethritis, epididymitis or other complications while under treatment. The treatment with mercury saligenin was begun in March of this year and the number of cases thus far treated has been too small to warrant conclusions, but the duration of a number of them has been less than a month, and the number of complications has been about the same so that the present outlook of the treatment is encouraging.

In laying these facts before you at this meeting it has not been intended to present them as a finished research, but merely as a report of progress to show you some of the things that we are attempting to accomplish in the Department of Pharmacology of the University of Minnesota.

DISCUSSION

DR. R. E. FARR, Minneapolis: It is perfectly evident that, to men like Professor Hirschfelder, we must look for the development along the lines of better local anesthesia. You know, of course, that all local anesthetics, until recently, were discovered accidentally. Quinine was discovered by making a therapeutic injection of it in cases of malaria. Dr. Hirschfelder is developing this as Ehrlich developed salvarsan. He is following it out scientifically and I am satisfied we will get better anesthetics. We want a better anesthetic for its practical application. We have many local anesthetics that are plenty good enough, so far as anesthesia goes, but we want to cut down the toxicity. Why? Because we want anesthesia quickly and in a manner where we can teach

it to anybody in a minimum amount of time and bring the whole medical profession into this field, and not confine it to a few experts. That, together with a better surgical technic, is what is going to put local anesthesia on the map.

I once used saligenin in a case of hypertrophic pyloric stenosis in a baby that weighed four pounds. That baby had a perfect anesthesia and went through the operation without crying. I had a case of intussusception in a male, with eighteen or twenty inches of the intestine invaginated. We have photographs of that case with the bowel lying out on his abdomen. We have had an acute appendix and two or three other major cases in which we used saligenin. We closed our interthoracic goiter case without drainage, which is a severe test of the drug in relation to wound healing. We opened the wound 2 or 3 days later to let out a blood clot, about the size of a walnut, and once more sealed the wound with adhesive plaster. The patient had no rise of temperature nor any difficulty whatever. Therefore, I am inclined to believe, from the short experience I have had with this new drug, that it has possibilities. I told Dr. Hirschfelder that if I was given a chance to use it in a hundred cases I would be able to tell him more definitely what I think about it. In dealing with matters of this kind we have to depend upon clinical judgment and the personal equation and the facts are hard to obtain.

DOCTOR G. L. LABAT, Paris, France: The subject presented to us is of great interest and proves how much its author is anxious to obtain an ideal anesthesia. We have been using several agents, such as cocain, stovain, and novocain for many years. Novocain has proved to be the best up to date, but though ten times less toxic than cocain, it cannot be used deliberately without risk. I am pleased to know that Dr. Farr's results with saligenin have been very good. I do much more nerve blocking than local infiltration, consequently using smaller quantities of 1 and 2 per cent solutions. As a rule, after making caudal injections we have to wait twenty to thirty minutes before we can obtain a good anesthesia, particularly for dilatation and curettage, perineorrhaphy, and prostatectomy. The anesthesia lasts about two hours. For abdominal or vaginal hysterectomy caudal injection is not sufficient. We have occasionally added to novocain other agents, such as sodium carbonate or calcium chlorid, so as to obtain more rapid anesthesia of longer duration. We have used a 2 per cent solution in these cases and have had satisfactory results. It appears that a 2 per cent solution of saligenin used by Dr. Farr for infiltration purposes is four times weaker than a 2 per cent novocain solution, and this would mean using an 8 per cent solution in caudal injections, with no better results than with novocain. May I suggest that Dr. Hirschfelder be pleased to try and find some other substance which would give us a better sacral anesthesia than novocain. As you know, the nerves in the sacral canal are covered by a very thick imper-

meable membrane which does not permit of easy and rapid diffusion of the anesthetic fluid. The anesthesia is, on the other hand, rapidly absorbed by the venous plexuses, thus giving rise to toxic symptoms. If with these general ideas Dr. Hirschfelder could continue his research work, I am sure we would be grateful to him.

DR. FARR: Would you mind telling us, Professor Labat, what dose you use in caudal anesthesia?

DOCTOR LABAT: We have two solutions, a 1 per cent solution and a 2 per cent solution. Of the 1 per cent solution I use from 40 c.c. to 60 c.c., and of the 2 per cent solution, from 20 c.c. to 30 c.c., adding in every case 20 drops of adrenalin to 100 c.c.

DR. G. J. THOMAS, Minneapolis: I think Dr. Hirschfelder deserves great credit for giving us a new and safe local anesthetic, and he should have every encouragement to continue his work.

I know in doing urological work at the dispensary and hospital we are satisfied with cocain and novocain and it is difficult to get us to change. I have, after many requests from Dr. Hirschfelder used saligenin for dilation of stricture of the urethra, for treatment and operations about the urethra and bladder and in a small number of cases I have found it just as satisfactory and as safe as when using cocain or novocain. I have not been able to compare the results of saligenin with cocain in the same individual.

In doing cystoscopy, which is a painful procedure it is difficult to know how much anesthesia is produced by any anesthetic because the personal element of the patient and nervousness must always be considered. After we have had a hundred cases we will be able to give Dr. Hirschfelder more definite information as to what saligenin will do in the urinary tract.

I think such work as Dr. Hirschfelder is doing is the sort of work that will give us new ideas. It is commendable work and we as clinicians must certainly encourage much more than we do the work of the laboratory worker and the experimental worker.

DR. HIRSCHFELDER (closing the discussion): I

would like to say to the members of the Association that I have brought this report before you simply in the form of a report of progress, without making any definite and final claims. Unfortunately, as I stated in my paper, the mere question of the manufacture of a chemical substance, even one that is fairly simple to synthesize, is a different thing from the manufacture of the same substance on a factory scale.

There are at present two or three firms engaged in the problem of getting this substance on a factory production basis, and we hope therein it will be on a factory or at least on a middle scale production, and then it will be possible for me to submit enough material to Dr. Farr and to Dr. Thomas to give the thing a proper trial. The thing I have been trying to do and have reported to you was merely to sketch an outline of the possibilities along which we hope to develop it, and not to give any final report. Therefore, as I have previously remarked, I am not claiming anything except introducing a new drug which I think has some possibilities.

As to the question of the introduction of caudal anesthesia. We took that up at the suggestion of Dr. Litzenberg because he wanted us to try out some caudal anesthesia, and we are still in the stage of trying it out. I will say, however, to Professor Labat that we have found the use of procain in one or two per cent solution satisfactory for intraspinal anesthesia in cats, though it is dangerous. I feel very little hesitation in saying that we can go up to as high as a 6 per cent saligenin solution without incurring even comparable toxicity. Two c.c. of 1 per cent procain will stop the respiration in the cat where we can get satisfactory anesthesia lasting for as long as twenty minutes, with only 2 per cent of saligenin. The quantity which Professor Labat uses, 40 to 60 c.c. of 1 per cent, or 20 or 30 c.c. of 2 per cent in the caudal canal is very large. I believe Dr. Farr uses 4 ounces of 1 per cent. I have no hesitation in foretelling that we will be able to use a much higher concentration of saligenin than that which we have been using in our experimental work on the cat, which, in matters of spinal anesthesia is so sensitive that it has not nine lives, but only about half a life.



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EDITORIAL

RECONSTRUCTIVE SURGERY

Elsewhere in this issue* appears an article which gives a broader view to the responsibilities put on surgery than is generally understood to be imposed. As medicine has certain responsibilities toward the prevention of disease and also toward the public health in general, so has surgery an obligation quite comparable. Besides the nice questions of surgical diagnoses, necessity of operative interference, surgical pathology, mechanical ability, manual dexterity and the other factors that enter into careful surgery of today, comes the necessity for careful consideration of etiology in both diseased conditions and injuries. Then, as it is necessary to know how an accident happened surgeons must accept the responsibility for prevention of these happenings. It is not enough to patch up the broken parts after the happening, the actual happening must be prevented. So, also, it is not enough to supervise the recovery of a patient to the point where he leaves the hospital; surgery must return him to work, must make him again a factor of economic importance in the world. The development of this

idea has been rapid. Begun as a factor of great economic importance in industrial surgery, it developed to a high degree of usefulness with great rapidity during the war in the return of the troops to their line of duty; and today there is a wide chance for usefulness, to salvage the human scrap-heap in our midst and return the individual units to the ranks of useful citizenry.

The general public has learned of rehabilitation and kindred expressions from the efforts which the government has put forth and has learned the practicality of the procedures and will cooperate intelligently with any constructive efforts surgeons may make to make the scheme more widespread. As a group the medical profession must watch itself well that no chance of serving the public as a whole is neglected. In our desires to perpetuate the medical profession with a few and better doctors we must not let the public suffer for medical attention; nor because of a paucity of regular medical practitioners can we let the various cults and paths grow up to lower the standards of scientific attention which we are educating the public to expect. There is a certain sociological side to medicine as a profession that must not be lost sight of in our development of medicine as an individualistic science.

It is likely that we are neglecting large opportunities of service to the handicapped in our cities of the Northwest today. We do not know of any place with machinery for dealing with these problems nor a group comparable to the Service League for the Handicapped from the Board of Education mentioned in the article. Some scheme of this sort should be carried on by the laity with medical supervision and made uniform for the entire state by placing it under the state government. Every place large enough to have a factory or like enterprise is large enough to have a hospital and has also some sort of a scrap-heap with which work can be done. A helping hand extended wisely will take from the group of dependents and add to the ranks of useful citizenry.

By applying in these times of normalcy some of the conditions begun in industry and developed during the war, the medical profession will be accepting one of its responsibility to the people.

C. E. S.

*Reconstructive Surgery, Harry E. Mock, M. D., F. A. C. S., Chicago, Ill., page 343.

THE CATHOLIC HOSPITAL ASSOCIATION

Last year, in June, the Catholic Hospital Association, enrolling most of the Catholic hospitals in the United States and Canada, met at St. Thomas College. This was the fifth annual convention; the first was held at Milwaukee in 1916.

The association may be said unqualifiedly to have been the product of the foresight, energy and enthusiasm of its president, Rev. Charles B. Moulinier, S. J., of Marquette University. His interest in Catholic hospitals came through his early recognition of the vital part they should play in medical education. When the early effort at the organization of the medical colleges was directed toward Marquette, his keen appreciation sensed the righteousness of the move, and he at once became a very vigorous ally of such pioneers in this movement as Flexner and Bowman. With the latter he has spent a large part of the past two years traveling over the United States and Canada, assisting in the standardizing educational propaganda of the American College of Surgeons.

The various Catholic Sisterhoods, taken as a whole, have made hospital work one of their chief endeavors. The result is that a very large percentage of all hospitalization is in their hands. However critical those conversant with the facts may be, few would ever be able to say that their intentions and desires were not always of the purest, the most sublime and self-sacrificing. In other words, Father Moulinier foresaw that while the various Sisterhoods might be short on many technical matters, they had an enormous advantage in their permanency, their devotion to their life work, and their cordial relations with large masses of people. Accordingly, it has been a great inspiration to see how wholeheartedly they have entered into the full spirit of co-operation, for an improvement of their standards and betterment of their service.

This should be brought to the attention of Minnesota particularly, because, due to the superb facilities provided by St. Thomas College and the Catholic Sisterhoods and convents of both St. Paul and Minneapolis, the association is to meet again at the same place this year, June 21st to June 25th. This return engagement, as it were, is of striking enough interest

to merit particular attention, and reflects not a little credit on Minnesota. It is not often that a convention chooses to meet, at least on succeeding years, in the same place. The officers of the association this year had particularly desired to meet in the East, or at least as far east as Pittsburgh. However, inasmuch as a large number of Sisters attend the conventions, and due to their inability to utilize public accommodations must have provided living quarters and refectory facilities by their Sister associates, no city could be found in the Middle East that could accommodate the large number that will attend. Further, the St. Thomas College buildings provide ideal lecture and conference rooms, as well as space for the numerous commercial exhibits. These facilities again bring to mind the cramped, unsuitable hotel quarters in which most of our medical conferences are held.

Naturally, the clergy and Sisters from near and far, coming to these conventions, learn something of Minnesota and its cities, and much there is to offer. Nevertheless, this very opportunity points also to our responsibilities. All of our large Minnesota cities have splendid Catholic hospitals. St. Mary's in Minneapolis is one of the most modern and exquisitely furnished hospitals in America, with an unparalleled location on the very banks of the Father of Waters, opposite the University; St. Mary's in Rochester did not need its perfectly huge new addition to give it world wide fame; St. Joseph's in St. Paul, is a splendid older institution, with the very finest hospital traditions, and counts on its staff, past and present, many men who have made medical history in Minnesota, men who have helped give to St. Paul something of the atmosphere that comes only to those cities that have had a succession of studious men in the learned professions.

Hospital Progress is the official organ or magazine for the association, and is published in Milwaukee by the Bruce Publishing Company. This journal jumped at once into a very wide circulation, and furnishes a constant medium of helpfulness to its numerous readers. The technical excellence of this hospital paper is in part accounted for by the fact that its publishers had already made a great success of certain other publications, notably an educational journal. Much credit is also due Dr. B.

F. McGrath, the secretary, who in addition to editing the Journal and conducting the business affairs of the association, occupies the chair of experimental Surgery in Marquette University.

It has been hinted in some quarters that hospital standardization may ultimately arrive at a point where the physician is only a cog in the machinery. This is a reflection from the time when certain striking medical personalities were the whole troupe, and insisted on having the spotlight centered on them all the time. This was a shortsighted policy, both for the physician and the hospital, because it gave a sense of security, both medically and scientifically, that was unjustified. Towering personalities, such as Osler and J. B. Murphy, left their deep impression on their respective institutions in which they worked. Osler on the one hand, however, left his impression indelibly written into the personalities and points of view of those who succeeded him; America, and Chicago particularly, have suffered in an unknown measure because Murphy did not teach his immediate associates as he did his remote admirers. There is developing presently a fine productive spirit about the hospitals of Boston: the Massachusetts General and the Peter Brent Brigham will reflect this long after Cabot and Christian have passed off the stage. Now, this tendency for the growth of hospital personalities we should all foster and encourage.

The Catholic Hospital Association is to be our guest again this year. We medical men should go to the meeting in as large numbers as possible. All our hospitals should see to it that representatives and members of the staff are in attendance, and that they will bring back the numerous instructive points from the most abstruse ethical considerations that should guide us, to the simplest advice as to the best way to operate a laundry. Too many of us do not take seriously enough the myriad problems that confront the present day hospital. We have not come to see fully enough, as yet, how large a part of our profession the hospital has come to be. With the present rather extravagant tendency for men to group themselves for general diagnostic and surgical practice, the opportunities afforded by a well balanced staff have not been given sufficient contrasting considera-

tion. Nearly all the advantages of so-called "Group Medicine," could be attained by the practical utilization of the equipment of a modern hospital of 75 or more beds, provided a well balanced staff would see fit to merge its personal interests sufficiently to give the patient the benefit thereof. Among other matters of interest offered in the medical portion of the convention program, will be an evening session for doctors, held at the St. Paul Hotel, and portraying "An Ideal Staff Meeting."

E. L. T.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

Physicians Licensed April, 1921

- Anderson, Howard Clayton, care of General Hospital, Minneapolis, Minn.
 Diehl, Harold Sheely, 1321 6th St. S. E., Minneapolis, Minn.
 Engstrand, Oscar Julius, care of Swedish Hospital, Minneapolis, Minn.
 Fitz, Reginald, Rochester, Minn.
 Foss, Allen Richard, care of General Hospital, Minneapolis, Minn.
 Haben, Harold Clinton, care of University Hospital, Minneapolis, Minn.
 Hall, Earl Chauncey, care of General Hospital, Minneapolis, Minn.
 Keith, Norman Macdonnell, care of Mayo Clinic, Rochester, Minn.
 McBeath, Ewing Cleveland, care of St. Mary's Hospital, Minneapolis, Minn.
 McVicar, Chas. Stanley, care of Mayo Clinic, Rochester, Minn.
 Napoliello, Vincent, 414 Oak St. S. E. Minneapolis Minn.
 Wagner, Charles Edward, Lock Haven, Pa., 527 W. Main street.

THROUGH RECIPROCITY

- Abramson, Benj. Wm., Anamoose, N. D.
 Amberg, Samuel, Rochester, Minn.
 Anderson, Richard Elseph, Willmar, Minn.
 Bernard, Bethune Caldwell, Lake Park, Minn.
 Bonta, Maurice Buford, Rochester, Minn.
 Bozer, Hermann Eugene, Rochester, Minn.
 Brandt, Arnold Louis, Red Wing, Minn.
 Brown, George E., Rochester, Minn.
 Chambers, Edward Francis, S. Rochester, Minn.
 Chandler, Orville Barnes, care of Miller Hospital Clinic, St. Paul, Minn.
 Desjardins, Arthur Ulderic, Rochester, Minn.
 Edlund, Gustaf, Jr., care of Miller Hospital, St. Paul, Minn.
 Figl, Fred Adam, Rochester, Minn.
 Greene, Willard Parker, 4006 W. 44th St., Morning-side, Minneapolis, Minn.

Greenfield, William John, Rochester, Minn.
 Hardt, Leo Louis, Rochester, Minn.
 Harrington, Stuart William, Rochester, Minn.
 Helmholtz, Henry Frederic, Rochester, Minn.
 Kohlbry, Carl Otto, 600-700 Fidelity Bldg., Duluth, Minn.

Lissack, Edmund H. M., Waseca, Minn.
 Osburn, John N. N., 1009 Nicollet Ave., Minneapolis, Minn.

Sherman, Carnot H., Marine-on-St. Croix, Minn.
 Shillington, Maurice A., care of N. P. Hospital, Brainerd, Minn.

Walters, Henry Waltman, Rochester, Minn.

NATIONAL BOARD CREDENTIALS

Magath, Thos. Byrd, Rochester, Minn.

REPORTS AND ANNOUNCEMENTS OF SOCIETIES

PROGRAM

Mid-Summer Meeting Southern Minnesota Medical Association, Winona, Minnesota, Monday, June 27th and Tuesday, June 28th, 1921

OFFICERS

Dr. W. J. McCarthy, Madelia, President.
 Dr. G. F. Merritt, St. Peter, Treasurer.
 Dr. H. T. McGuigan, Red Wing, Secretary.
 Dr. A. F. Schmitt, Mankato, Director.

AFTERNOON SESSION, ARMORY

Monday, June 27th, 1921, 1:30 o'clock P. M.

Dr. O. J. Hagen, Moorhead, Minnesota, "Relation of Acute Infection to Chronic Disease."

Dr. N. J. Nessa, Sioux Falls, South Dakota, "X-Ray Diagnosis in Diseases of the Gastro-Intestinal Tract."

Dr. E. S. Judd, Rochester, Minnesota, "Surgery of the Ureter."

Dr. E. C. Rosenow, Rochester, Minnesota, "Further Results in the Serum Treatment of Poliomyelitis."

Dr. T. B. Magath, Rochester, Minnesota, "Echinococcus Diseases: Etiology and Laboratory Aids to Diagnosis."

Dr. H. C. Bumpus, Rochester, Minnesota, "Relation of Focal Infection to Diseases of the Urinary Tract."

EVENING SESSION

Monday, June 27th, 1921

Masonic Temple, 6:30 o'clock P. M.

BANQUET

Dr. D. L. Edsall, Boston, Massachusetts, "Some Public Relations of Medicine, Especially in Connection With Industry."

Dr. F. J. Gaenslen, Milwaukee, Wisconsin, "The Diagnosis and Treatment of Chronic Lesions of the Hip Joint."

Dr. A. B. Kanavel, Chicago, Illinois, "Surgery of the Hand."

FORENOON SESSION, ARMORY

Tuesday, June 28th, 1921, 8 A. M. to 12 M.
 Business Meeting.

Dr. W. O. Ott, Rochester, Minnesota, "Diagnosis and Treatment of Sciatica."

Dr. J. T. Schlesselman, Mankato, Minnesota, "Nasal Accessory Sinus Infection."

Dr. H. B. Zimmerman, St. Paul, Minnesota, "Intestinal Obstruction."

Dr. G. B. New, Rochester, Minnesota, "Treatment of Multiple Papillomas of the Larynx in Children."

Dr. S. A. Slater, Worthington, Minnesota, "The Childs Place in the Tuberculosis Campaign."

Dr. H. E. Michelson, Minneapolis, Minnesota, "Comparative Values of the Antisyphilitic Drugs."

Dr. H. F. Helmholtz, Rochester, Minnesota, "Par-enteral Infection in Infancy."

ANNOUNCEMENTS

HEADQUARTERS AT HOTEL WINONA

The Winona County Medical Society, The Winona Country Club, The Winona Elks Club, The Winona Kiwanis Club, and The Civic and Commerce Association of Winona invite and extend a cordial welcome to the Southern Minnesota Medical Association, and all members, their wives and sweethearts, and to the friends of the medical profession to come to Winona, June 27th and 28th, and enjoy the hospitalities that the good people of Winona will offer.

Reservations for Banquet and Hotel accommodations should be secured from the Chairman Committee of Arrangements.

Applications for Membership should be made at the Secretary's Desk.

All communications relative to the program should be addressed to Dr. A. F. Schmitt, Mankato, Minnesota.

OBITUARY

James Wiley Grant, M. D., Richville, Minn., died April 8, 1921, at the age of seventy-four years.

MEMORIAM TO DR. GILLETTE

Arthur J. Gillette is dead. No man was ever more unselfish or more true to the spirit of his chosen career. Nor did man ever achieve more of lasting good for the community than he. He died in the full time of activity, beloved by his colleagues, esteemed not only as a surgeon but as a man. His sympathies were broad and his untiring efforts in behalf of the crippled and deformed continued unabated up to his death.

Dr. Gillette was born in Rice county, Minnesota, on October 28th, 1863, educated in country schools, Hamline University and the Minnesota College Hospital. He later attended the St. Paul Medical School, from which he graduated in 1886. He then served in the New York Orthopedic Dispensary and Hospital as Resident Surgeon for a period of one year. In 1888 he joined the Ramsey County Medical Society and acted as Treasurer throughout the two

following years, being President of that society in 1896. He was a charter member and in 1900 President of the American Orthopedic Association. In 1908 he was President of the Minnesota Academy of Medicine and was Professor of Orthopedic Surgery at the University of Minnesota up to the time of his death.

In 1897 he conceived and carried to completion the idea which found expression in the State Hospital for Indigent Crippled and Deformed Children, which will ever remain a lasting monument to his creative vision and executive genius.

His lofty ideals, unselfish motives and constant friendship won him early and wide recognition as a leader in his chosen specialty. He will be long remembered by all with whom he came in contact, both for his gentle and considerate kindness and for his professional attainments.

C. EUGENE RIGGS,
ROBERT EARL,
WALLACE H. COLE,

for the Ramsey County Medical Society.

OF GENERAL INTEREST

Dr. A. E. Amundsen, of Little Falls, attended the clinic recently held in Minneapolis.

Dr. M. M. Hursh, of Grand Rapids, Minn., attended the recent clinic held in Minneapolis.

Dr. John F. Fulton, of St. Paul, announces the removal of his offices to 728 Lowry Building.

Dr. F. W. Ostergren, 991 Payne Avenue, St. Paul, is convalescing from an operation for appendicitis.

Dr. W. G. Strobel, of Welcome, has become associated with the Duluth Clinic, Department of Surgery.

Dr. C. W. Bray, of Biwabik, has been reappointed as a member of the St. Louis County Child Welfare board.

Dr. H. Holte, of Crookston, has returned to resume the practice of medicine with the Northwestern Clinic.

Dr. Carl O. Kohlbray, of St. Louis, Mo., has become associated with the Department of Pediatrics at the Duluth Clinic.

Dr. R. D. Gardner, of Eveleth, has gone to International Falls where he will be associated with Dr. B. F. Osborn.

Dr. B. Odegaard, of Albert Lea, expects to move to Emmons, Minnesota, where he will engage in general practice.

Dr. J. N. Risjord has returned to Fertile from Chicago where he has been spending the past six months in medical studies.

Dr. Walter E. Scarborough, of Faribault, has gone to Chicago, where he will take a two months post graduate course in medicine.

Dr. G. A. Stevenson, of Albert Lea, has recently returned from Chicago where he has spent the past few weeks in study of diseases of the eyes.

Dr. James A. Johnson, Minneapolis, read a paper on Hidden Malignancies at the spring meeting of the Red River Valley Medical Society at Crookston.

Dr. Louis H. Warfield, of the Medical College of the University of Wisconsin, addressed a recent meeting of the St. Louis County Medical Society held at Duluth.

Dr. Henry G. Collie, of Brainerd, sailed April 6th for England. His position at the Northern Pacific Hospital will be temporarily filled by Dr. M. A. Shillington, of Minneapolis.

Dr. Horace M. Brown, of Milwaukee, delivered a Mayo Foundation Lecture April 8; his subject was, "The anatomical habitat of the soul: Hammurabi to Harvey and beyond."

Dr. George E. Putney, of Paynesville, has been recommissioned a member of the State Board of Medical Examiners by Governor Preus. The appointment is for a term of three years.

Dr. B. F. Holm, of Wells, Minn. has sold his practice to Drs. F. E. Best and S. H. Anderson. Dr. Holm expects, later in the summer, to go East where he will take up a post graduate course in medicine.

Dr. E. Schatz, of Montgomery, has recently returned from Chicago where he has been taking a post graduate course in medicine. He is planning to move to St. Cloud where he will engage in general practice.

Dr. H. E. Peterson, of Granite Falls, has received word from the Federal authorities that he has been appointed Medical Examiner at Granite Falls for the Bureau of War Risk Insurance for the ensuing year.

Dr. P. A. White, formerly of the Mayo Clinic, who has been associate surgeon of the Aberdeen Clinic, at Aberdeen, S. D., is leaving for Davenport, Iowa, where he will practice surgery with Dr. William Allen, of that city.

Dr. John N. Osburn, of the Episcopal Eye and Ear Hospital of Washington, has become a member of the Nicollet Clinic. He is to be associated with Dr. William R. Murray in the division of Ophthalmology and Oto-laryngology.

Dr. Gilbert J. Thomas, Minneapolis, read a paper, "A new diagnostic sign in tumors of the pelvis of the kidney, with report of a case of papillary adenocarcinoma", at the March meeting of the Chicago Urological Society.

Dr. Frank T. Cavanor, of Minneapolis, left April 9th for post-graduate work in Harvard and Columbia Universities. Drs. John S. Macnie and John H. Morse, 503 Donaldson Building, will care for Dr. Cavanor's patients while he is away.

Dr. Julia Keats Erb, of Minneapolis, a classmate of the late Dr. Flora L. S. Aldrich, of Anoka, has made arrangements to locate in Anoka. She will move to that place as soon as she can sever her connections with the Abbott Hospital at Minneapolis.

The Minnesota State Legislature has just passed a law compelling every person employing help of any kind except domestic to insure his liability or furnish

an indemnity bond to the state. This effects every physician in the state who employs clerical assistance.

At a recent weekly meeting of the staff members and employees of the Mayo Clinic, Drs. Hartman and Lockwood gave a most interesting account of their recent trip to Mexico, where they were called upon by President Obregon to perform a slight operation.

Dr. H. V. Hanson, formerly of New London, Minn., has become associated with the Union Clinic at Willmar. Dr. Hanson served as surgeon with the English army for twenty-two months during the World War. He will specialize in diseases of the eye, ear, nose and throat.

Dr. and Mrs. Woodward L. Colby, of St. Paul, have closed their home at 2103 Iglehart Avenue, and have gone to Chicago where Dr. Colby is attending clinics. He will leave soon for the East where he will enter Harvard Medical school for post graduate work in pediatrics.

The Division of Venereal Disease of the Minnesota State Board of Health calls attention to the fact that the last Congress failed to make any appropriation for their activities, and inasmuch as the State Legislature did not increase its previous appropriation of \$30,000, their activities, of necessity, will be curtailed during the coming year. The co-operation of the profession of the state is requested.

The recent Institute of Venereal Disease Control and Social Health Service in Washington showed an attendance of about six hundred and fifty, and the interest seemed to warrant the planning of a general public health institute to take place in the fall of 1921. A great variety of courses on the subject of public health and sanitation will be offered at this time by the recognized authorities in the various branches.

The *Nation's Health* is the new name, beginning formerly known as *Modern Medicine*. This magazine was originally known as the *Interstate Medical Journal* and its scope has gradually changed from a clinical journal to one devoted to the broad field its name now implies. Curative medicine will not be included in the subject material handled by the *Nation's Health*, but instead, problems of health related to industrial units, schools, infant and child welfare, school health and related activities.

The Cooperative Health and Nursing Service with headquarters at 438 University Avenue, St. Paul, has been instituted to furnish home nursing to families whose incomes range from \$1000 to \$2500. The service was instituted by the Housewives' Union and consists of visits by an employed graduate nurse in acute and chronic cases not ill enough to go to a hospital. One of the rules adopted requires that no case may be cared for more than twenty-four hours unless a physician is in charge. This Service as it expands may solve some of the difficulties confronting the individual with small income when sickness comes.

The Post Graduate School of the Vienna Medical School announces a series of medical courses for June, 1921, and calls attention to the fact that foreigners may take courses in the Post Graduate School both in German and in English. A nominal charge of one thousand crowns (about \$150) is charged to cover expenses for those attending the official lectures. Special courses may be arranged as before the war. On the program are seen the names of Professors Elselsberg, Marburg, Schlesinger, Kovacs, Lorenz, Eppinger, Ortener, Frankl, Erdheim, Falta, Weibl, Adler, Zappert, Schick and Pirquet. The absence of the von in this program is noticeable.

NEW AND NON-OFFICIAL REMEDIES

During April the following articles have been accepted by the Council on Pharmacy and Chemistry for inclusion in New and Non-official Remedies:

Armour & Co.:

Suprarenalin Solution-Armour.

The Diarsenol Co.:

Silver Diarsenol,

0.05 Gm. Ampules

0.1 Gm. Ampules

0.15 Gm. Ampules

0.2 Gm. Ampules

0.25 Gm. Ampules.

Hynson, Westcott & Dunning:

Mercurochrome-220-Soluble.

Arsphenamine-Squibb.—A brand of arsphenamine N. N. R. (see New and Non-official Remedies, 1921, p. 41). Arsphenamine-Squibb is marketed in ampules containing, respectively, 0.1 Gm., 0.2 Gm., 0.3 Gm., 0.4 Gm., 0.5 Gm., 0.6 Gm. Arsphenamine. E. R. Squibb & Sons, New York.

Neoarsphenamine-Squibb.—A brand of neoarsphenamine N. N. R. (New and Non official Remedies 1921, p. 45.) Neoarsphenamine-Squibb is marketed in ampules containing, respectively, 0.15 Gm., 0.3 Gm., 0.45 Gm., 0.6 Gm., 0.9 Gm. Neoarsphenamine.

Sodium Arsphenamine-Squibb.—A brand of sodium arsphenamine N. N. R. (see New and Non-official Remedies 1921, p. 48). Sodium arsphenamine-Squibb is marketed in ampules containing, respectively, 0.15 Gm., 0.3 Gm., 0.45 Gm., 0.6 Gm., 0.75 Gm., 0.9 Gm. sodium arsphenamine. E. R. Squibb & Sons, New York. Jour. A. M. A., April 9, p. 1007).

PROPAGANDA FOR REFORM

Digifolin not admitted to N. N. R.—Digifolin-Ciba is a product of the Society of Chemical Industry of Basle, Switzerland. It is claimed to be "a preparation of digitalis leaves, that has been freed from their useless and harmful principles such as digitonin (saponin), coloring and inert matter, etc., but does contain all the really valuable and therapeutically

active constituents of the leaves, namely; digitoxin and digitalein in their natural proportions. The Council on Pharmacy and Chemistry reports that there is no evidence that digifolin contains all of the glucosides of digitalis as they exist in the leaf and that it is extremely improbable that this is the case, because one cannot remove the saponin without altering the other active principles of digitalis. The Council also held unwarranted the claim that Digifolin does not have the disadvantages of galenical digitalis preparations since it is well established that the untoward effects of digitalis are inherent in the principles that exert the desired effects of digitalis and that these may be avoided largely by a carefully regulated dose of any digitalis preparation. The claim that Digifolin-Ciba has all the advantages and none of the disadvantages of digitalis has been refuted so frequently that manufacturers must be aware that it is untenable. Further, the report concludes, the claims now made for Digifolin are essentially those made nearly four years ago, at which time the attention of the American agent was called to their unwarranted character (Jour. A. M. A., April 2, 1921, p. 952).

Hexamethylenamin and sodium acid phosphate.—Hexamethylenamin acts in acid urine only. Hence, if the urine is not acid, sodium acid phosphate should be given in doses of 1 to 2 gm. midway between the doses of hexamethylenamin. Enough of the sodium acid phosphate should be given to render the urine acid, but not enough to cause diarrhea (Jour. A. M. A., April 9, 1921, p. 1031).

More Misbranded Nostrums.—The following preparations have been the subject of prosecution by the federal authorities charged with the enforcement of the Food and Drugs Act, on the ground that the therapeutic claims made for them were false and fraudulent: *Treatamiento Zendejas* (Panfilo Zendejas), a solution containing potassium iodid, plant extractives and sugar. *Helmitol* (Bayer Co., Inc.), tablets consisting of hexamethylenamin, methylenecitrate and talc. *Benetol Vaginal Suppositories* (Benetol Co.), consisting essentially of alpha and beta naphthol, boric acid and traces of menthol and phenol in a cacao butter base. *Mowerys Gonorrhea Paste* (Binkley Medicine Co.), essentially powdered cubebs, copaiba balsam, alum and magnesia (Jour. A. M. A., April 30, 1921, p. 1263).

Cod Liver Oil in Rickets.—For many years cod liver oil has been regarded almost as a specific against rickets in children. During recent years it has been made reasonably certain that the administration of cod liver oil alters the calcium balance in such a manner that calcium will be retained in the body and that it increases the capacity of rachitic children to take up and hold calcium. Since the beneficial effects of cod liver oil on rickets may be due to its liberal content of vitamine A, frequently described as the Fat-Soluble food accessory, it is interesting to know that crude unrefined cod liver oil may be

250 times as rich as butter in vitamine A and that samples of refined oil, although not so active as the crude oil, were also far superior to butter in their vitamine potency. The ease with which the Fat-Soluble A Vitamine of cod liver oil is destroyed by reagents and drastic manipulations make the various "refinements" of cod liver oil products sold as proprietary preparations even more reprehensible than they have seemed in the past (Jour. A. M. A., April 9, 1921, p. 1009).

Some of Loeser's Intravenous Solutions.—The Council on Pharmacy and Chemistry reports that Loeser's Intravenous Solution of Hexamethylenamin and Sodium Iodid, Loeser's Intravenous Solution of Sodium Salicylate, Loeser's Intravenous Solution of Sodium Iodid and Loeser's Intravenous Solution of Mercury Bichlorid, manufactured by the New York Intravenous Laboratory, were not accepted for New and Non-official Remedies because they are sold under misleading claims regarding their alleged safety and efficiency. The fundamental objection to the claims made for these preparations is the general claim of superiority and safety of the intravenous method. The Council continues to hold that intravenous medication generally is not as safe as oral medication, even with relatively harmless substances and that it does not give "improved clinical results" except under rather narrowly confined circumstances, namely, if the drug undergoes decomposition in the alimentary tract, if it is not absorbed, if it causes serious direct local reactions, or if time is an urgent element. The Council has recognized intravenous preparations which satisfy these requirements. The Council concluded that these solutions did not meet these conditions (Jour. A. M. A., April 16, 1921, p. 1120).

Benzyl Benzoate.—This drug has been widely accepted, chiefly on the basis of experiments on excised organs as an efficient antispasmodic agent for smooth muscle in various regions. Few observations have been made, however, as to its action on intact organs. Recent investigation has raised serious doubt as to the efficiency of benzyl benzoate as an antispasmodic for the intact uterus, intestines, stomach and bronchi. Large doses injected into dogs intravenously (so that the drug might act on the smooth muscles of these organs) gave almost totally negative results. This investigation suggests that allowances should be made for impressions, reflex influences, the psychic state and natural recovery before drawing definite conclusions as to the beneficial effect of benzyl benzoate, especially in such capricious conditions as hiccup, whooping cough, asthma and dysmenorrhea for which it has been advocated (Jour. A. M. A., April 30, 1921, p. 1252).



BOOK REVIEWS

RATIONAL TREATMENT OF TUBERCULOSIS.

Charles Sabourn, English Translation, Sixth Edition. F. A. Davis Co. Price \$3.50.

The author aptly titles his work the "rational" treatment of pulmonary tuberculosis.

It is a book which every general practitioner should read as well as those particularly interested in chest diseases.

The fundamental measures, rest, pure air, wholesome food are dilated upon, and of equal if not of more value, the small, apparently insignificant (to the physician) complaints which are so frequently passed off with a light word. Codliver oil, iodine, creosote, over feeding, phosphites are discarded by the author. Tuberculin, he thinks, is in the "state of hesitation".

The author's "ambulatory treatment of hemoptysis" is rather startling but sounds plausible.

The chapter on sanitoriums is excellent. The author argues strongly and effectually for institutional treatment and very pointedly remarks that a sanatorium is no better than the physician in charge of it. No climate exists, he reiterates, which will cure tuberculosis.

Artificial pneumothorax and the care of laryngeal cases were not mentioned by the author which constitutes a rather serious omission.

On the whole it is a worth while book and merits the attention of the profession.

EVERETT K. GEER.

EXOPHTHALMIC GOITER AND ITS NONSURGICAL TREATMENT, by Israel Bram, M. D., C. V.

Mosby Company, St. Louis. Octavo, Cloth, pp. 438.

The author in explaining the existence of this volume hopes (1) to stimulate keener interest in the disease in question. (2) To convince that exophthalmic goiter does not belong in the realm of surgery. (3) To urge an early diagnosis and institute proper non surgical treatment. Continuing he gives in detail the anatomy, physiology, pathology, symptomology, diagnosis and differential diagnosis, diagnostic tests, course and prognosis, non surgical treatment, and closes with case histories.

The reviewer cannot help feeling that this volume is a splendid general resume on exophthalmic goiter, but presents little that is new or original and impresses one with the idea that its sole existence is to present the non surgical treatment of exophthalmic goiter and especially the use of quinine hydrobromate, which the author considers specific. In view of the fact that the author is unable to determine the causative factor of Graves disease or to describe how quinine hydrobromate exerts its beneficial effects, it would seem unreasonable to accept this treatment as specific, nevertheless we must recognize the results obtained in his large series of cases, but

until more conclusive results are obtained by purely medical treatment, we must concede to surgery its place in the treatment of the disease.

W. C. RUTHERFORD.

HARROWERS MONOGRAPHS ON THE INTERNAL SECRETIONS: Hyperthyroidism, Volume I, No. 1.

This excellent monograph is one of a series of publications by the author on the medical aspects of the internal secretory glands.

The merits of the monograph depend largely on the stress laid upon the systematic searching for the origin of this symptom-complex, which he believes to be a toxemia, either chemical, bacterial or emotional and under the etiology covers the predisposing influences, the paramount importance of focal infection and endocrine dysfunction.

The symptomatology is well displayed giving more particularly the neurological, ocular and circulatory aspects.

In the diagnosis the importance of metabollimetry along with clinical and laboratory tests such as: Loewi's mydriasis, Goetsch, thyroid function, glucose tolerance, quinine, Abderhalden's ferment, pituitary and other tests is brought out.

In the differential diagnosis the neurosis, adrenal dysfunction, tuberculosis and simple goitre are differentiated.

The prognosis of hyperthyroidism in his opinion is not good.

Treatment from all angles is considered, as, general hygiene, hydrotherapy, x-ray, radium, drugs and organotherapy. His patients are put on a routine regime which consists of absolute rest, well balanced diet, Crotties sedative formula, removal of focal infection and the study of possible endocrine causes.

This is a very interesting work, well written and arranged and should be of interest to the surgeon as well as the internist.

A. P. GRUENHAGEN.

PLASTIC SURGERY OF THE FACE, By H. D. Gillies, C. B. E., F. R. C. S., Major R. A. M. C.

This is a rather extensive and complete work, based entirely on war injuries.

The first chapter is devoted to a short history of plastic surgery and a discussion of the principles to be considered in performing plastic operations. The main text is made up of individual cases with pictures and illustrations before and after treatment, together with history and treatment of each case. The individual cases are grouped according to the location and character of injury, making it a very useful reference work to men interested in plastic surgery.

C. B. TEISBERG.



PROCEEDINGS OF THE MINNESOTA ACADEMY OF MEDICINE

*Cases Presented at April Meeting of Minnesota
Academy of Medicine. April 13th, 1921.*

Dr. E. S. Judd, Rochester, Minn.

1. CASE NO. 247737.

J. B. D., male, age 22 years. Married 18 months. Family and personal history negative. Denies lues and specific urethritis. Operated for left indirect inguinal hernia October 8, 1918. Uneventful convalescence. In hospital 10 days. (3-23-21) Since left herniotomy here in Oct., 1918, has had two or three spells of pain a year lasting 6 or 7 days at a time. Pain acute, severe, comes on about 10 minutes after urinating, doubles him up, lower left quadrant at site of herniotomy scar, referred to left testicle, lasts two or three hours after micturition. This occurs during spell after every urination. Last attack has lasted four months, about same, not progressively worse; no opiate here, at home opiate. Suppository gr. 1-4 before urinating three times a day, none last four weeks. No frequency, no dysuria, no hematuria, no pain in either kidney region.

Physical findings: normal weight 140 lbs.; present weight 135 lbs.; duration loss wt. 6 months. S. B. P. 124. D. B. P. 80. Pulse 90. No fever. Few palpable glands right axilla. Ear, nose and throat examination negative except for tonsils (2). Urine: Spec. gr. 1027; pus cells (2). Blood: hemoglobin 70 per cent; leukocytes 8400. Wassermann negative. Phthalein 30 per cent. Blood urea nitrogen 13 milligrams per 100 c. c. Blood urea 28 milligrams per 100 c. c. K. U. B. negative. Cystoscopic examination: Obstruction left ureter—probably functionless left kidney.

Patent operated April 1, 1921: left vesiculitis. Left vesiculectomy. Left rectus incision. In exploration was unable to find the ureter but the seminal vesicle was many times larger than normal and definitely inflamed with a good many adhesions in this area. After searching for the ureter was unable to feel the kidney on the left side. The kidney on the right side felt about twice normal size. Removed seminal vesicle.

Discussion by Dr. Braasch: We thought of the possibility of ligature of ureter in herniotomy, also possibility of stone occluding the lower ureter. It followed one case of granulation tissue in bladder wall, regarded at operation as inoperable carcinoma. Patent lived and later passed stone and granulation tissue disappeared. We thought this might be a similar case. The vesicle was found on rectal examination. The case has several points of exceeding interest.

2. CASE 344470.

T. E. C., 48 years of age, married 35 years. Contracted gonorrhea 16 years ago. Tonsillectomy at 18 years. Influenza in 1890 and 1918. Two years ago began to pass bloody urine and had pain in the

head of penis at the end of urination. Remissions. At times has voided a considerable amount of blood; at other times just enough to be noticeable. Recently troubled with frequency. Had been cystoscoped 6 times in past 2 years. Nine days previous to his visit to our clinic he had an attack of acute retention for 2 hours with considerable pain. Passed bladder stone 17 days ago. Attacks of hematuria occurred once in 4 to 7 days and lasted about 2 days. Pain has remained about same throughout 2 years; seems referred to suprapubic area and with urination but usually of moderate degree except when he passed the stone 17 days ago, which he says was about one-half inch long and three-eighths inch thick. For 6 months past scarcely a day without some blood in urine. No chills, fever or sweats. Had been told he had an obstruction in left ureter.

Wassermann negative. Urinalysis negative with the exception of an occasional red blood cell, and pus 1-15 cells in the field. Combined phthalein test 330 c. c., 50 per cent return in 2 hours 15 minutes. X-ray of urinary tract negative. Cystoscopic report: left hematuria with obstruction at the meatus. Neoplasm? Stone? Radiogram: suspicious shadow lower left ureter. Evident neoplasm partially protruding from left meatus as unable to introduce catheter. No secretion apparent but bleeds easily on contact. Right kidney normal.

Diagnosis: left ureteral neoplasm; left renal neoplasm. Obstruction left meatus.

Operation January 10, 1921: Left nephrectomy for pyonephrosis, pyonephritis, with destruction of 80 per cent of the kidney substance. Kidney weighed 120 gms. and was full of pus. Partial subcapsular nephrectomy, ureter ligated and dropped back, with the recommendation that the ureter and piece of the bladder wall be removed later when patient's condition would permit.

Operation January 21, 1921: Left ureterectomy with resection of bladder wall, area size of silver dollar. Definite papillary epithelioma 8 cm. in diameter involving lower ureter. Ureter as large as a thumb throughout its entire course. Anterior extraperitoneal incision.

Discharged February 21, 1921 with wound healed and in good condition.

Dr. F. L. Adair, Minneapolis:

I wish to report two cases which are of no great interest in themselves but which illustrate the diagnostic possibilities of a method which I have tried out recently at the Minneapolis General Hospital. I fully realize that the procedure needs much more careful study before it can be definitely utilized. It seems to me that these two x-ray plates demonstrate definitely the possibilities of this method.

1. Minneapolis General Hospital, No. G-1980. Patient was about 3 months pregnant. She began to have vaginal bleeding and abdominal pain on February 6th. She passed a fetus about 2 days later and entered the hospital on February 12th where she

passed the afterbirth. She was discharged after several days with normal temperature and no bleeding. She returned to the hospital in a few days for bleeding. She was again sent home without bleeding. She returned again on March 22nd, flowing quite profusely. She was curetted and a perineorrhaphy done on April 2nd. She made an uneventful recovery. At the time of operation some iodoform gauze was inserted into the uterus which later the intern could not find. The x-ray plate was taken with the rectum and bladder filled with air, hoping that the gauze might possibly be located in the vagina or uterus. The record of the physical examination is as follows, so far as the internal genitalia are concerned: uterus retrocessed and acutely ante-flexed. It was pulled to the right of the midline and was freely movable. The x-ray plate, as you see, shows a shadow posterior to the right and lying rather high indenting the bladder on the right side. It lies high because the uterus was markedly retrocessed, the cervix resting almost on the sacrum, and because the x-rays were directed through the pelvis almost vertically to the plane of the inlet which projects the shadow rather high.

2. Minneapolis General Hospital, G-1685, was that of a young woman 23 years old. She was admitted to the hospital on March 9th with a yellowish vaginal discharge. She had pain in both lower quadrants of the abdomen. She had been treated during the previous two weeks for acute gonorrhea. On admission, the tubes on both sides were enlarged and tender. These masses enlarged somewhat and became firmer. She was treated by rest in bed with hot douches following which the masses in the tubal region progressively decreased in size. On the 10th of March bimanual examination showed the uterus acutely ante-flexed, not freely movable, in good anterior position in close proximity to the pubes. There was a small mass palpable in the left adnexal region, slightly tender. A larger mass about 4 or 5 cm. in diameter was palpable in the right adnexal region. On the day following, March 11th, x-ray examination was made following the distention of the bladder with air. The catheter was left in place in the bladder. The outline of the bladder is very definitely shown. You can see quite distinctly the shadow of the uterus with a low-lying adnexal mass on the right side.

Discussed by Dr. Dennis: These two cases show a very interesting development of the x-ray.

Dr. Farr: We have tried in the same individual the two schemes—dilating the rectum and bladder with air in comparison with pneumoperitoneum. Our impression was that we had better success with pneumoperitoneum in the cases in which it was used.

Dr. William Davis, St. Paul, gave a verbal report of a case recently seen at autopsy.

A man 65 years of age had been my patient for 35 years. An otherwise healthy man but gave a his-

tory of attacks of abdominal pain. His only severe illness occurred about the age of 25 (about 40 years ago) when patient was living in Philadelphia. During patient's lifetime he had almost nothing the matter with him except that he was always troubled with intestinal indigestion and a good deal of abdominal distress. No normal bowel movements, always numerous and explosive, and until last sickness patient never took a laxative. At autopsy the cecum was found bound by adhesions. On opening the cecum a stump about one-half inch long was found and near the stump was a cicatrix, evidently where there had been an ulcer in the bowel. It is rather an unusual thing for a case to show up in this way that was seen about 45 years ago by a member of this Academy (Dr. R. J. Hill). I had an opportunity to watch this patient through the greater part of his lifetime and had a chance to see the autopsy. An appendectomy done by Nature.

Discussed by Dr. R. J. Hill: Dr. Davis has given practically all I know about the case. When I first saw him he was suffering from perforated typhlitis. Two or three of the best physicians in Philadelphia were in attendance and gave up hope of his recovery. He finally made a very slow and tedious recovery, it being a month before the patient was out of danger. It only goes to show that we used to see cases of typhlitis and that they did not all die. It shows what Nature sometimes does if she is let alone.

Dr. A. C. Strachauer, Minneapolis, gave the following cases:

1. Gastrostomy under local anesthesia, for bleeding ulcer, upon greatly exsanguinated patient in extremis.

Louise K., age 36. Pain in epigastrium.

Appendectomy at 16 for questionable symptoms. Subsequent history one of irregular periods of epigastric distress coming on soon after eating. Slight food and soda relief. Relieved by vomiting. Has no trouble if on restricted diet.

Severe attack of epigastric pain March 5th, following meal, increasing in severity and with but transient soda relief. For 10 days was restricted to modified Sippy diet. March 15th had attack of syncope; later vomited a pint or more of dark blood. This was repeated a few hours later. Was very pale and weak. Patient was admitted to the medical service of the University Hospital on March 17th, 1921. Was given morphine in large quantities, ice-bag to epigastrium; enteroclysis; alkalies and thromboplastin administered by mouth. Patient vomited dark blood five different times while in hospital. Was transfused three times, and finally transferred to surgical service.

Temperature 97.2 degrees; pulse 145; hb. 20 per cent; respiration 24. Patient exsanguinated; mouth dry; restless; sighing respiration; skin dry, pale and cold.

Operation, March 31st, 1921, by Dr. Strachauer. Laparotomy under local anesthesia. Stomach de-

livered into wound; most carefully and thoroughly examined for ulcer. Gastro-hepatic omentum divided. Examining hand and fingers in lesser peritoneal cavity so as to thoroughly palpate the lesser curvature and posterior wall of the stomach. Duodenum negative for ulcer. A two or three inch gastrostomy incision longitudinally in the anterior wall of the stomach immediately proximal to the pylorus was made. The pylorus was relaxed and was normal. Upon requesting the patient to strain or cough, bile would be forced through the pylorus into the stomach. Examination of the interior of the stomach was carefully carried out. Upon sponging along the lesser curvature some 3 1-2 inches above the pylorus a clot was evidently dislodged from a vessel which began to spurt, a stream the size of an ordinary lead pencil for a distance of one-half to three-quarters of an inch. This blood vessel was at the margin of an ulcer the size of a coffee bean. This ulcer could not be felt upon palpation, even though it could be seen, proving that negative palpation of the stomach is not reliable in ruling out all ulcers. The ulcer and bleeding vessel were whipped over with interrupted linen and chromic sutures, and the gastrostomy closed.

On the third day the patient's condition was good; hgb. 32 per cent; temperature 98.6 per cent; pulse 120, and with the exception of a thrombophlebitis of the left femoral vein has made an uneventful recovery.

2. Juvenile tabes with gastrointestinal crises, misdiagnosed as acute appendicitis.

Blanche L., age 9 years.

Pain in right lower abdomen. March 12th, shortly after supper, patient complained of severe, cramp-like pain under right rib margin. This persisted for several hours, then disappeared, leaving a residual tenderness for the next 24 hours. No vomiting, no nausea, no chills, no fever. Four days later had another attack of greater severity than the first. Unable to lie on right side and unable to stand upright or walk because of pain. Patient was admitted to the University Hospital on the fifth day. Temperature 101, pulse 110; leucocytes 19,400; 81 per cent p. m. n.

Well nourished girl with flushed cheeks. Abdomen slightly distended and tense, with marked rigidity; more on right side. Marked by tenderness to deep pressure on right side. Marked and definite right psoas spasm. Rectal negative. Lungs negative.

Patient had snuffles. Circumscribed ulcerated area on palate.

Operation, March 17th, 1921, by Dr. A. A. Zierold, resident Surgical Fellow. Abdomen opened and explored. Entirely negative.

Subsequent neurological report: Colloidgold 0032210000. Sp. Wassermann+. Mother+. Pupils regular, sluggish in reaction; slightly unequal. K. J. and A. J. very sluggish. Deep muscular pain sense diminished, but present. No disturbance of vibration or position sense. Girdle sensory disturbance positive.

3. Man about 60 years of age in collapse and shock. Nothing in history of interest except extremely high blood pressure and nephritis. Perforated ulcer was considered. On opening abdomen, was found to have 11 feet of gangrenous bowel. This was removed, but unfortunately gangrene extended into jejunum and patient died after living for three days. I would like to know if any of you have had any similar experience and what would be the possibilities if this bowel had healed.

Dr. Corbett: Some experimental work has been done by Bernheim in closing off the bowel at this point and was ordinarily fatal in about 18 hours. Their conclusions were that closing the bowel at upper end, death resulted in about 18 hours; and closing at lower end, death resulted in from 3 to 4 days.

Dr. Dennis: I can add one case similar to Dr. Strachauer's first case. This was seen several years ago with Dr. Goodrich. At autopsy we were unable to find the ulcer. Finally after taking organs out and floating them in water we found the ulcer.

Dr. R. E. Farr, Minneapolis, reported two cases illustrating the use of pneumoperitoneum as an aid in making roentgen-ray diagnosis.

1. Man, age 35, with history that fitted very well a cholecystitis with attacks of biliary colic. In the film shown you will see on the right a shadow which at first was considered the gall bladder but which was later ruled out, and believed to be kidney. At top of that you see the much smaller tumor containing many gall-stones.

2. The second case illustrates the use of pneumoperitoneum in the lower abdomen. With patient in high Trendelenberg position and using pneumoperitoneum in lower abdomen we get a great deal of benefit in some cases.

This woman had a diagnosis of exophthalmic goitre made by me two years before. She was operated and made splendid recovery with the exception of one condition. She had angioneurotic edema, most marked that I have ever seen; looked something like a case of leprosy. While attacks improved somewhat they continued and we believed she had some disturbance of the endocrine system. She had a history of pain and soreness in lower abdomen for from 6 to 7 years. Bimanual examination was not made at the time of exophthalmic treatment as this phase of the disease was not gone into carefully. She returned two months ago on account of the condition in the lower abdomen. On examination we could feel a soft floating mass which was diagnosed as an ovarian cyst. There had been no disturbance of menstruation.

We did a pneumoperitoneum and made this plate. You can see the ovarian cyst running up to about the 2nd lumbar and in the central line you can see several small shadows. She had not had an enema, therefore we did not have the courage of our convictions and did not make an absolute diagnosis.

Considered diagnosis of ovarian cyst fibroid, or ovarian cyst dermoid.

Operation revealed right ovarian cyst and left ovarian dermoid.

Dr. A. W. Dennis, St. Paul, gave the following case report:

Woman about 30 years of age. Operated on two years ago for inguinal and infected right femoral hernia. About one year ago came complaining of severe pain in abdomen which came and disappeared and which had no relation with anything which was familiar. Patient was not relieved by different positions which usually help abdominal pain. Examined with fluoroscope and no diagnosis made. Patient sought relief elsewhere. Later she came back to St. Paul, was fluoroscoped again and still no diagnosis made. For last 2 or 3 months patient had been quite comfortable. Day before yesterday I was sent for and I think I never saw a patient in such severe abdominal pain as she was. Gave 1/8 gr. morphine, then 1/6 gr. and another 1/6 gr. before she got any relief. Patient began vomiting later in day. Left hypochondriac region was about what would correspond to location of pain. Yesterday at noon a lump appeared in right side with slight soreness. Lump felt like something coming through the wall. This morning temperature went to 101, pulse 136, white count 23,000. Yesterday we attempted another fluoroscopy in the hospital but patient vomited the barium. This forenoon, following enema, she passed a large amount of blood. Made a diagnosis of intussusception.

At operation we found an intussusception which involved about 2 feet of ileum. (Specimen shown). We opened the cecum, resected the bowel through the cecum, put a tube through the union between the two small bowels and then closed the cecum.

I am not sure that this was the cause of her symp-

toms which she had had all this year, but I suspect that this is the cause.

Dr. C. W. More, Eveleth, read a Thesis entitled "Some Practical Experience with Injuries with Special Reference to Fractures."*

Dr. E. M. Hammes, St. Paul, read a paper entitled "Intracranial Telangiectasis,"** with report of two cases.

Discussed by Dr. H. P. Ritchie: I am hardly prepared to discuss any of the general features of the situation. My experience is limited to this one case. There was no question but what the boy was in great distress and mentally he was the very picture of despondency and was willing to undergo any procedure offering even a minimum amount of relief.

The flap was turned down with the base to the ear and as this came off I had a real thrill. Extending through the dura was a distinct and definite cyst and we thought it could be readily eradicated. As we reached this dark colored area we found the dura was adherent, and then to add to our disappointment we found an enormous vein, much dilated and tortuous. It looked as though I had hardly room to tie it between the bone margin and the vein itself. I tied all the branches and in looking around this was the only vein I was able to demonstrate. The tying of the vein must be careful work but is quite easy to do, and so far as we could see was without injury to the brain substance. He went off the table with a fairly sizable decompression operation. The patient had a stormy recovery but the mental attitude and appearance of the fellow is most remarkably changed.

—HARRY P. RITCHIE,
Secretary.

*This paper with discussion will be published in Minnesota Medicine at a later date.

**This paper will appear in Archives of Neurology and Psychiatry.

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